A WINDOW OPEN ON THE WORLD

The UNESCO Courier

UNITED NATIONS EDUCATIONAL SCIENTIFIC AND CULTURAL ORGANIZATION

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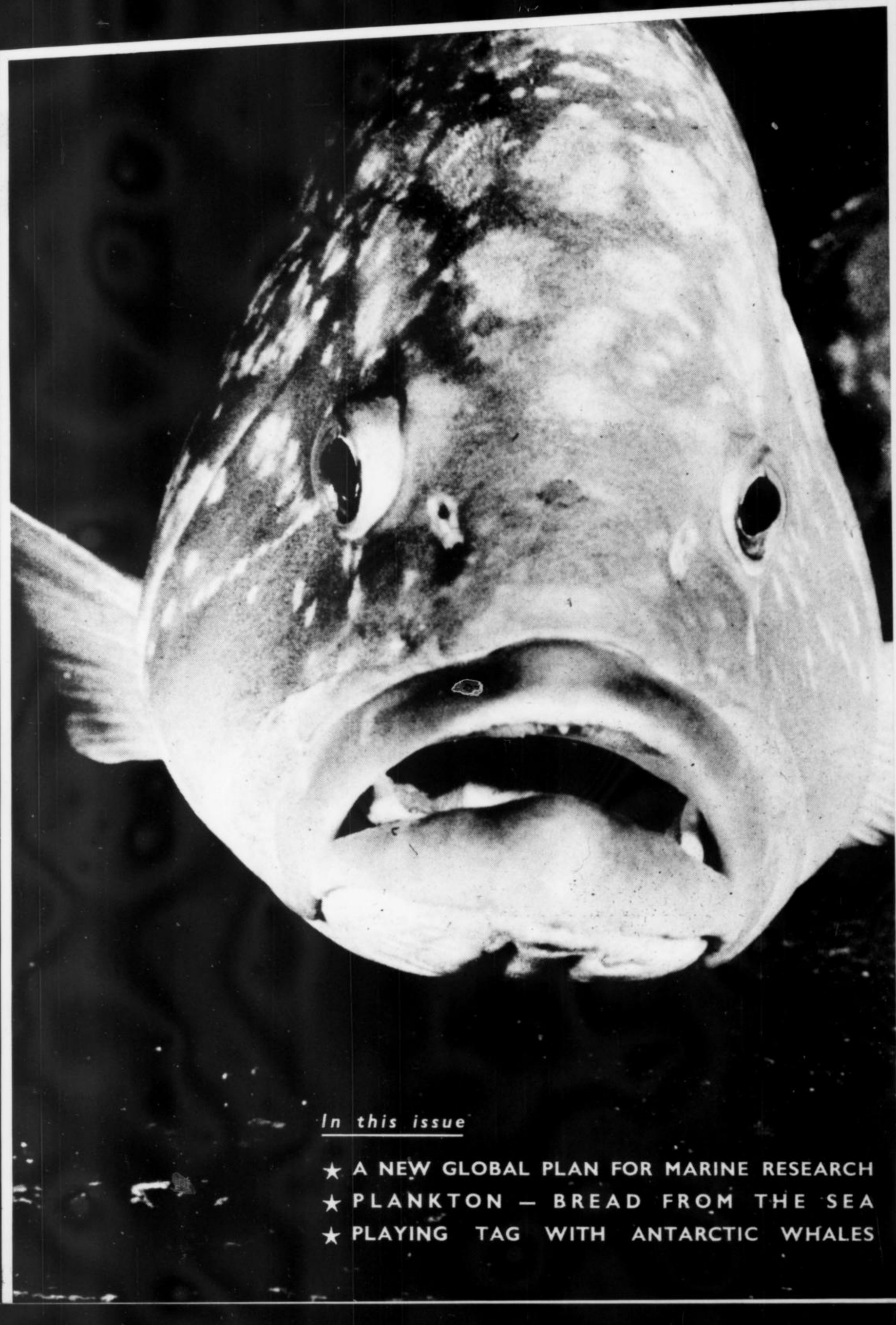

EXPLORING THE OCEAN WITH SCIENCE

FISH IN MYTH AND LEGEND

Greece's castles in the air

Sugar bowl hidden in a date palm

In this issue

★ A NEW GLOBAL PLAN FOR MARINE RESEARCH
★ PLANKTON — BREAD FROM THE SEA
★ PLAYING TAG WITH ANTARCTIC WHALES

ALL HANDS ON DECK WHEN TUNNY STRIKE
Everyone, including the captain and the cook, has a couple of hours of feverish, back-breaking work when a Pacific tunny boat meets a school of fish. Live sardines are thrown into the water as bait and when the tunny strike the sardines they go into a frenzy, strike at anything and can thus be pulled into the boat with simple barbless hooks. Tunny, also called "tuna", is one of the richest of seafoods, but little is known of its migratory and spawning habits. Today fishery biologists and other scientists are carrying out special studies of the tunny as part of a world-wide campaign to make better use of marine resources. See page 12.
(Photo Black Star-Rapho.)

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COVER PHOTO

PRIZE PREY of underwater spear and spring-gun fishermen in the Mediterranean is the meru. Weighing as much as 45 pounds, these fish swim with mouths agape, taking in whole octopi and lobsters. (Photo Rapho-Rebikoff)

ALTHOUGH nearly all nations have shores touching the sea most of the human race has never seen the ocean and few know it well. Yet it is humanity's great unused resource, and moreover, a truly international one.

The land is divided among nations ; the sea belongs to mankind. A few miles, adjacent to the shores, are under local control but they form a microscopic fraction of the 139 million square miles of the ocean surface — about two and a half times the entire land area of the earth. Its total volume is 328 million cubic miles, a figure which far surpasses the human imagination. The entire human race of more than 2,000 million persons, for example, could be contained in one-tenth of a single cubic mile !

This incredibly vast storehouse of mineral and food resources has hardly been tapped to meet man's needs. It provides, for instance, less than one per cent of the world's food. Every cubic mile of seawater contains 750 tons of nitrogen, 225 tons of phosphorus and nearly two million tons of potassium—three major agricultural fertilizers. Equally important is the rich plant-life of the sea : scientists calculate that a square mile of sea produces an average of 13,000 tons of vegetation per year, and a world total of probably five times that of vegetation on land.

Most of the sea plants are microscopic and simply serve to feed the fishes. But they are already recognized as potential food both for men and for domestic animals. Much more needs to be learned about their varieties, the conditions under which they grow best, and their nutritional value ; methods must be invented for cultivating and harvesting them

But the major practical objective of oceanographic research will be an increase in the availability of fish for human food. The U. N. Food and Agriculture Organization has estimated that the world's total annual production of fish and all sea foods, excluding whales, is about twenty-six million metric tons per year. The amount of fish caught and consumed could be increased many times if fishing were no longer an essentially primitive method of finding food, much as hunting was for our ancestors who roamed the woods in search of game.

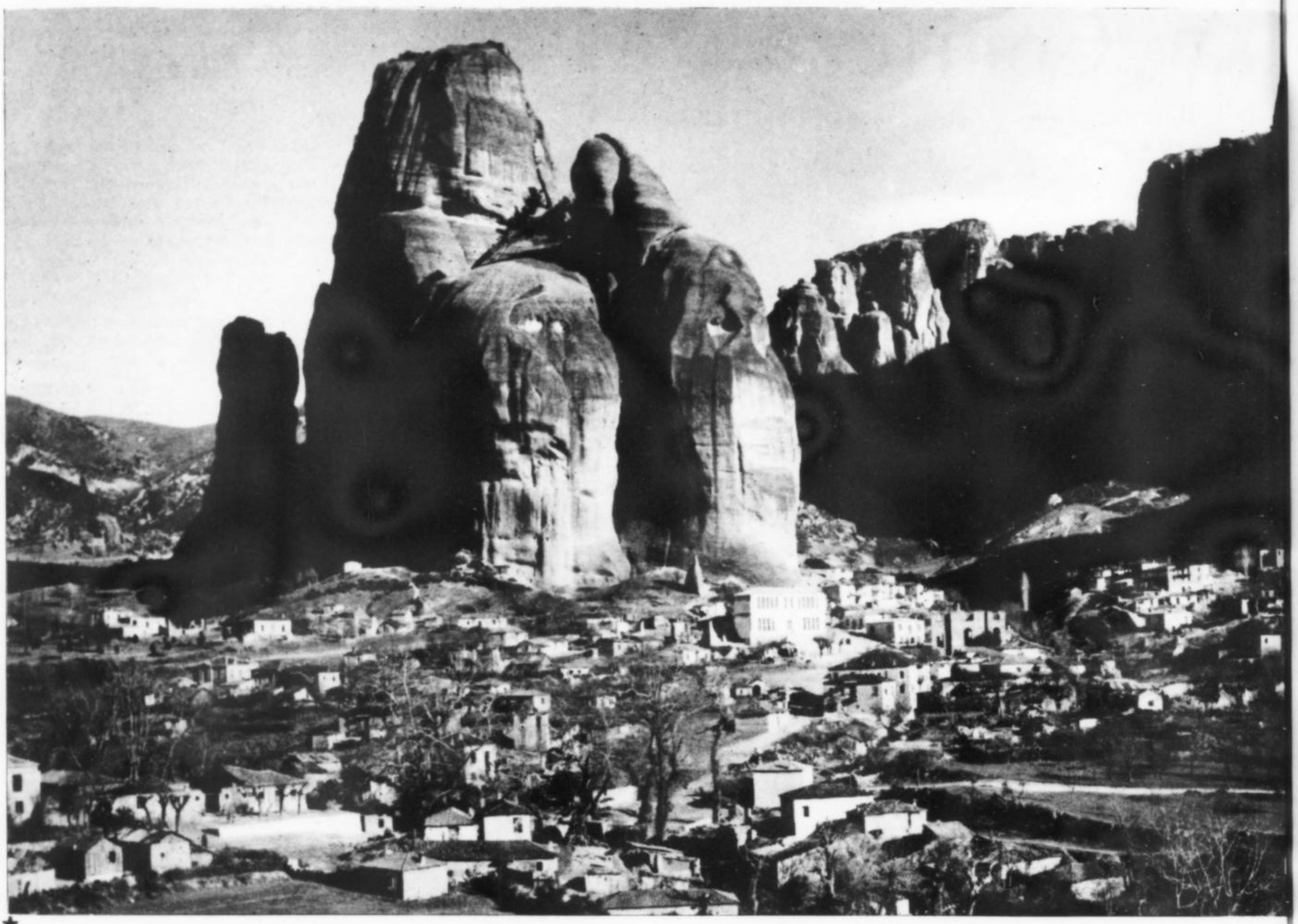
Many privately endowed and government institutes have developed new methods of studying the ocean depths, and revealed strange forms of deep-sea life. Recently international organizations like the Pacific Science Congress, the Indo-Pacific Fisheries Council, and F.A.O. have called attention to the research that is still needed, and especially to studies that will increase the world's food supply.

It is for this reason that Unesco is organizing a broader international attack on the problems of the sea as it has successfully done for the problems of the arid lands. As early as November 1953, Unesco participated in the studies on the development of oceanographic research in the Indo-Pacific region and last September at meetings of marine biology scientists in the Latin American region. Two months later, a programme of aid to oceanographic research on a world-wide scale, prepared in accord with F.A.O. was approved by Unesco's General Conference in Montevideo, Uruguay.

To co-ordinate this programme, Unesco is now setting up an International Advisory Committee on Marine Sciences. A first meeting of scientists was held in Rome in May. As in other fields of its work, Unesco cannot solve the complex problems of the sea all by itself. No human institution can. Unesco looks at the task ahead as a co-operative venture of long-term international research. It will serve as a world-wide link between the many organizations now dealing with these questions on a national, inter-governmental or international level and help to organize, encourage and co-ordinate research along specific lines.

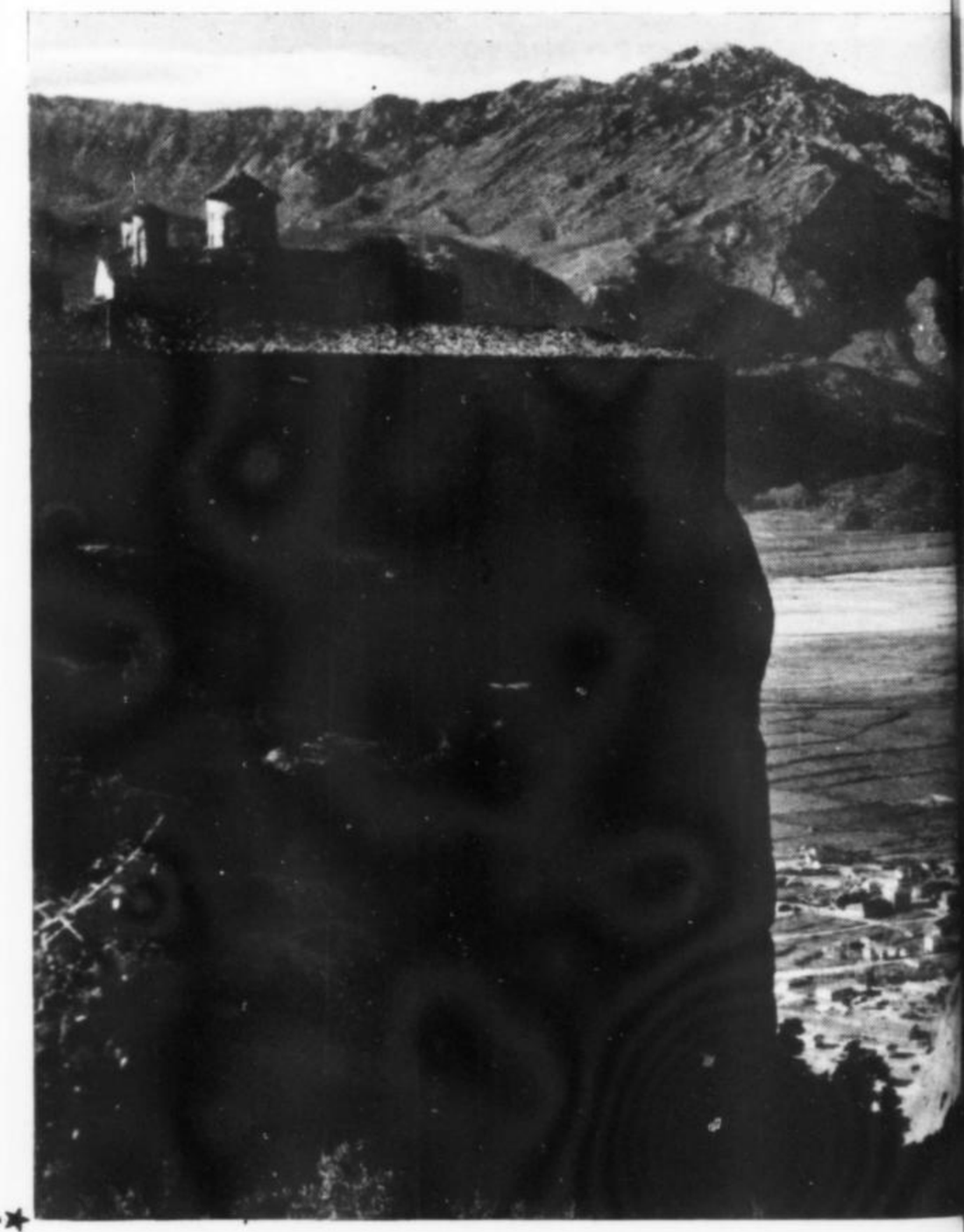
The rich resources of the sea will not be truly mastered until oceanography develops as a co-ordinated group of sciences as reliable as the other exact sciences. This is a vital need for the future with a world population of 4,000 million persons foreseen by the end of the present century—well within the lifetime of our own children.

Gerald WENDT.



Closer to heaven than to earth

The vast rock piles of the Meteora tower above the village of Kastrani on the edge of the Thessaly plain (above). This stone forest of giant pinnacles was chosen by medieval ascetics as a place of retreat from the world. The monks who first climbed these rocks felt they were much closer to heaven than to earth, as did the Stylites, the famous ascetics of the East who spent their whole lives perched on the columns of ancient temples. On the Meteora, the monks built hermitages, churches and, later, great monasteries, some of which are still occupied today. Monastery of St. Stephen (right) stands perched on the cliff-edge and dominates the town of Kalabaka, which, eight centuries ago was called Staghi, a contraction of three Greek words meaning "home of the saints". In the far distance glitter the snow-covered peaks of the Pindus mountains. Ancient engraving (opposite page) depicts religious buildings on the Meteora during most flourishing period of monastic life. (Meletzis photos.)

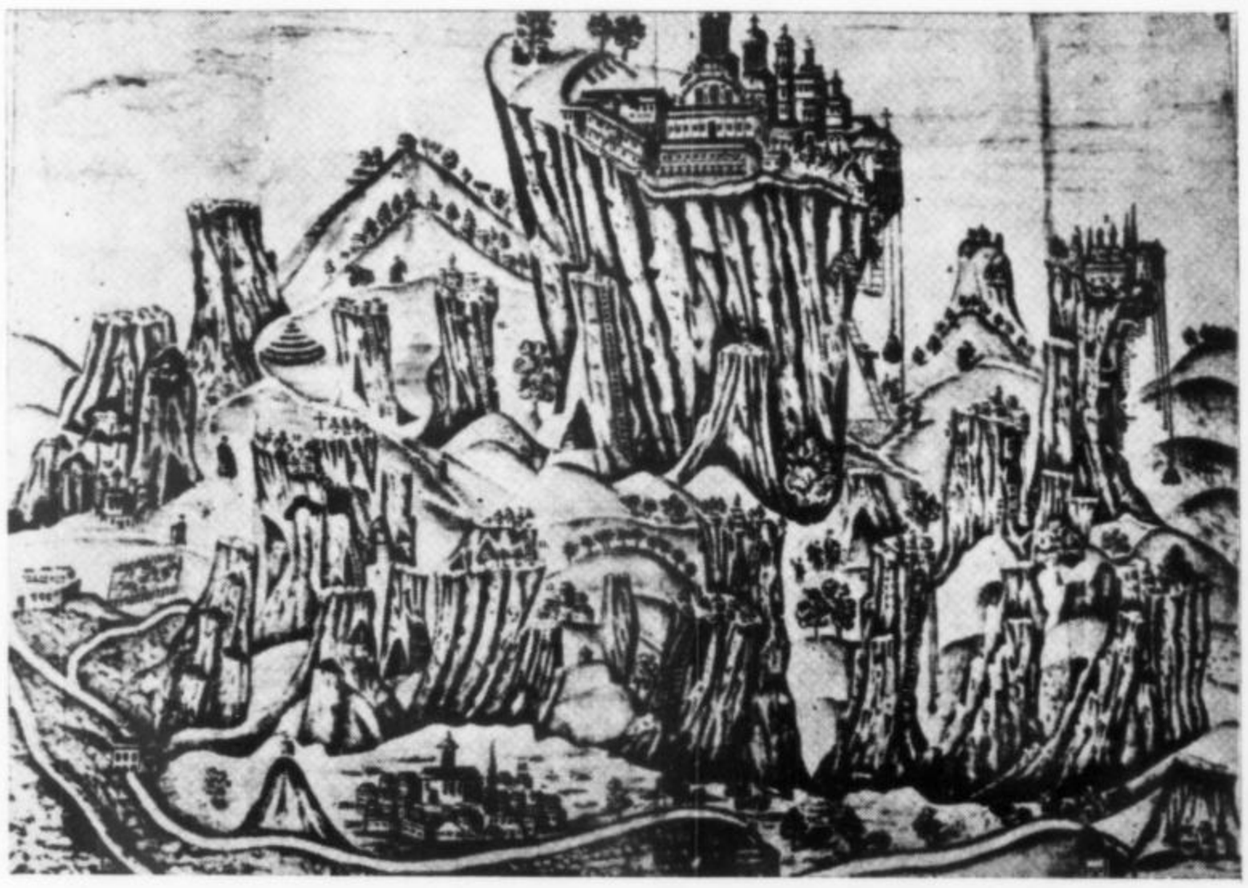


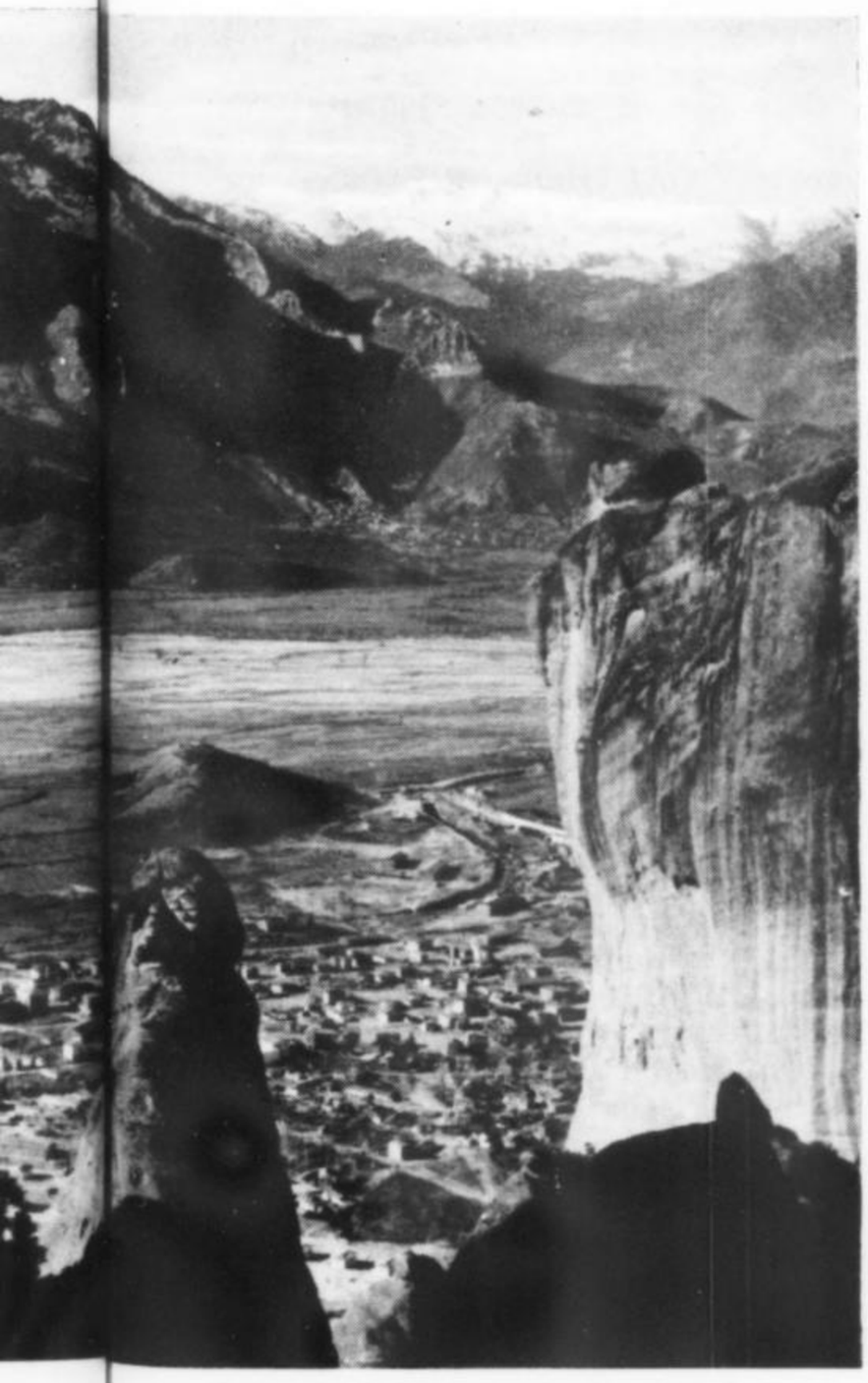
THE METEORA

Rock pinnacles 'hung in the air'

by Professor George Sotiriou

Member, Athens Academy and Director, Byzantine Museum





IN many places where men are striving to preserve and restore the ancient sites and monuments which form part of the world's cultural heritage, Unesco helps to organize and support their work. In particular it has encouraged efforts to make cultural treasures easily accessible to visitors from other lands. The need for new roads along which visitors could easily travel to the ancient sites was emphasized by Unesco missions which studied the problems of restoring and enhancing the ancient monuments of Syria and Lebanon in 1953. A recent achievement in this respect is now reported from Greece where a fine new road today leads to the Meteora, the fantastic rock formations on the edge of the plain of Thessaly. Below, Professor George Sotiriou describes the strange land of the Meteora and the medieval monasteries which crown their pinnacles.

IN the north-west corner of the plain of Thessaly, some eight hours journey by road, north of Athens, stands one of the strangest sights in the world: the Meteora, a group of gigantic black rocks rising up in the sky like vast pillars or massive ruins.

The early inhabitants of the region gave these rocks the name of "meteora" ("hung in the air") because they seem to be suspended in space, each separate from the others, at the entrance to a mountain-girt valley leading into the heart of the Pindus range.

Some geologists maintain that in very ancient times Thessaly was a lake and the Meteora were part of its rocky banks. Great earthquakes split these rocks apart, while on the eastern rim of the Thessalonian plain an enormous fault brought into being the lovely vale of Tempe and the two great mountains Olympus and Ossa. The waters of this lake formed the river Peneus which flows through Tempe into the gulf of Salonika.

Nowadays it is easy to climb these rocks and visit the great monasteries built there centuries ago. Only a few years ago the ascent still had to be made in nets, which the monks hauled up on pulleys from above, as depicted in certain old prints. In earlier times, sectional wooden ladders were used, hooked into the rock, and naturally enough the ascent was not without danger. Today, however, visitors can climb up safely by way of spiral staircases hewn into the rock. A recently made road now leads almost to the foot of the rock stairs.

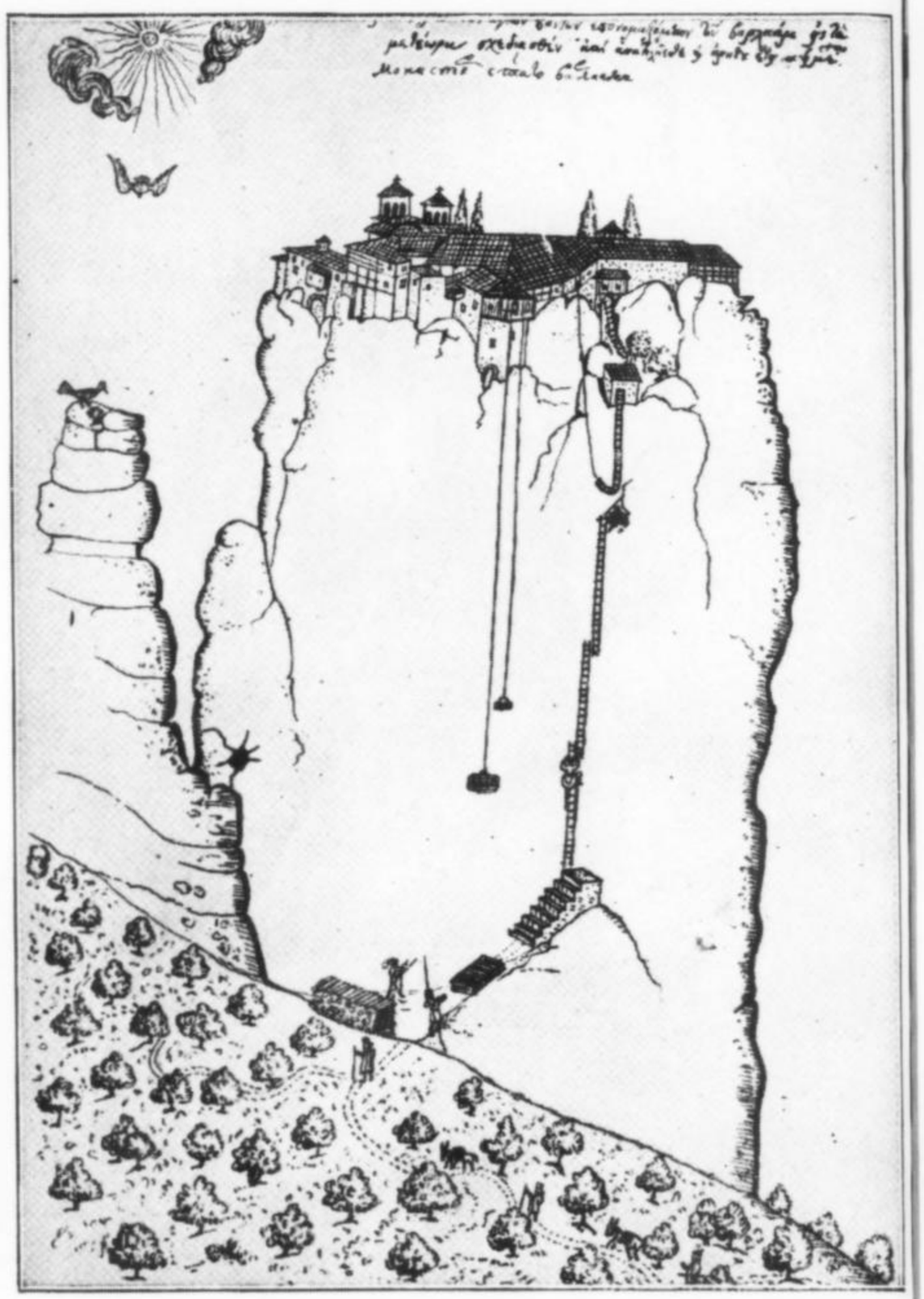
It is quite understandable that mediaeval ascetics should have chosen the Meteora as a place of retreat from the world. The monks who first clambered up these rocks no doubt felt that they were much closer to Heaven than to earth, as did the Stylites,

(Continued on next page)

THE METEORA

(Continued)

Nowadays it is possible to reach the Meteora monasteries by climbing spiral staircases hewn into the rock. Eighteenth century engraving (right) shows the hazardous means of ascent to the Varlaam monastery by sectional wooden ladders hooked into the smooth surface of the rocks. Materials and food were hauled up in baskets. Even a few years ago, visitors to some of the monasteries were still pulled up in nets which the monks raised by cords and pulleys. Below, the Varlaam monastery as visitors see it today. On opposite page, the Hermitage of St. Nicholas. What look like huge birds' nests on the cliff face are monks' cells, supported by slender wooden poles. Insets in text on these pages are a series of saints' heads reproduced from the frescoes in the little monastery of Ipapanti.



the famous ascetics of the East, who spent their lives perched on temple columns. A small basket attached to a length of rope, in which the pious would place morsels of food, was the hermit's only link with the outer world. The first monk of the Meteora was known by the name of "Ho tou Stylou", that is to say "he of the column", because the cave which was his hermitage lay beneath a rock shaped like a pillar.

It is probable that ascetics and monks sought refuge in the caves of the Meteora at a very early period, but the first historical reference to the monasteries of the Meteora appears in an edict of the Byzantine Emperor, Manuel Comnenus, dated 1143, which speaks of the foundation of the Sketis at Staghi. This was the name of the little town, now called Kalabaka, which lies at the foot of the rocks. "Staghi" is derived from the contraction of three Greek words "eis tous aghious", meaning "home of the saints", and it is clear that, there, the saints were the monks.

Gradually several hermitages were founded; then, on the Doupiani rock a church was built. Every Sunday all the ascetics gathered there for the celebration of Mass and thus a sort of monastic community came into being.

However, it was only during the 14th century that the great monasteries were founded, and from these emerged many eminent figures who played an important role in the organization of monastic life on the Meteora. Mention should be made of the Cenobite Athanassios, who was honoured as a saint after his death, and King John Doukas Paleologus, who became a monk under the name of "Joasaph". Athanassios founded the monastery of the Transfiguration which is still the most important and is known as the "Meteoron" or "Great Meteor". In it are the tomb of Athanassios and the portrait of Joasaph.

At the same period several other monasteries were founded: St. Stephen, Varlaam, Holy Trinity, the little monastery of the Ipapanti (Visitation), and that of Ayia Rosani. There are also several small monasteries in inaccessible spots on the site of former hermitages. Some of these are now in ruins.

Only five of these monasteries can now be visited: the Great Meteor, Varlaam, Holy Trinity, St. Stephen and Ayia Rosani. They are all built in the usual form of Eastern monasteries. The entrance consists of a large

courtyard, in the middle of which stands the main church—the Katholikon—with the chapels, the sacristy, the refectory and occasional guest-rooms. Surrounding the courtyard are the monks' cells.

A deep peace reigns. Several centuries seem to have dropped away, and yet the past is not dead. The monks with their mediaeval look complete the illusion. In silence they go to and fro

about the tasks assigned to them, faithful guardians of an age-old tradition.

The monastery of St. Stephen is the best preserved of those that remain today. The view from here across the Tempe Valley to the Pindus mountains

is magnificent, and many travellers make short stays at the monastery, before crossing the mountains which separate Thessaly from Epirus.

Inside the Katholikon, another world is revealed to the visitor's astonished gaze—the world of Christ and the Saints as they appeared to the imagination of those monks who, from the 14th to the 19th century covered the inside walls of the church with frescoes of scenes from the Holy Writ. As parts of these frescoes fell into disrepair, they were restored by the monks, so as to preserve the unity of the whole. Precise rules laid down in which part of the church certain holy personages were to be depicted. Thus the central dome was reserved for Christ the Saviour, the "Pancrator", who reigned over all. The Blessed Virgin is depicted in the altar apse, and the rest of the walls are almost entirely covered with scenes from the life of Christ and the Virgin.

The ante-naves of the monastery churches are full of frescoes depicting the lives of the saints—their martyrdoms and the miracles they performed. Painted in vivid colours, with a realism that is moving in its simplicity, these frescoes serve as a continual reminder that the path of holiness is a hard one.

The frescoes in the ante-nave of the Varlaam church are remarkable. They date from 1566 and are the work of the painter Frangos Katalanos. The martyrdom of various saints is depicted with an extraordinarily life-like vigour. On the north wall, the priest Sisoes contemplates with horror the skeleton of Alexander the Great, lying at his feet. The inscription reads: "Sisoes, renowned among ascetics, on seeing the exhumed body of that great and glorious King of the Greeks, Alexander, shudders at the thought of how glory decays with passing time; sadness comes over him and he laments: "Oh Death! Alas! who can escape thee?"

On the east wall appears a vast fresco of the Last Judgment.

Thus the monks always had before their eyes three ideas: inevitable Death; Paradise awaiting the faithful; Hell, the fate of sinners.

Hours can be spent in the contemplation of these memorials to the life and work of many simple and devout Christians who have passed from this world with their hearts and minds entirely given up to an ideal which they steadily sought to preserve and also to hand on to future generations.

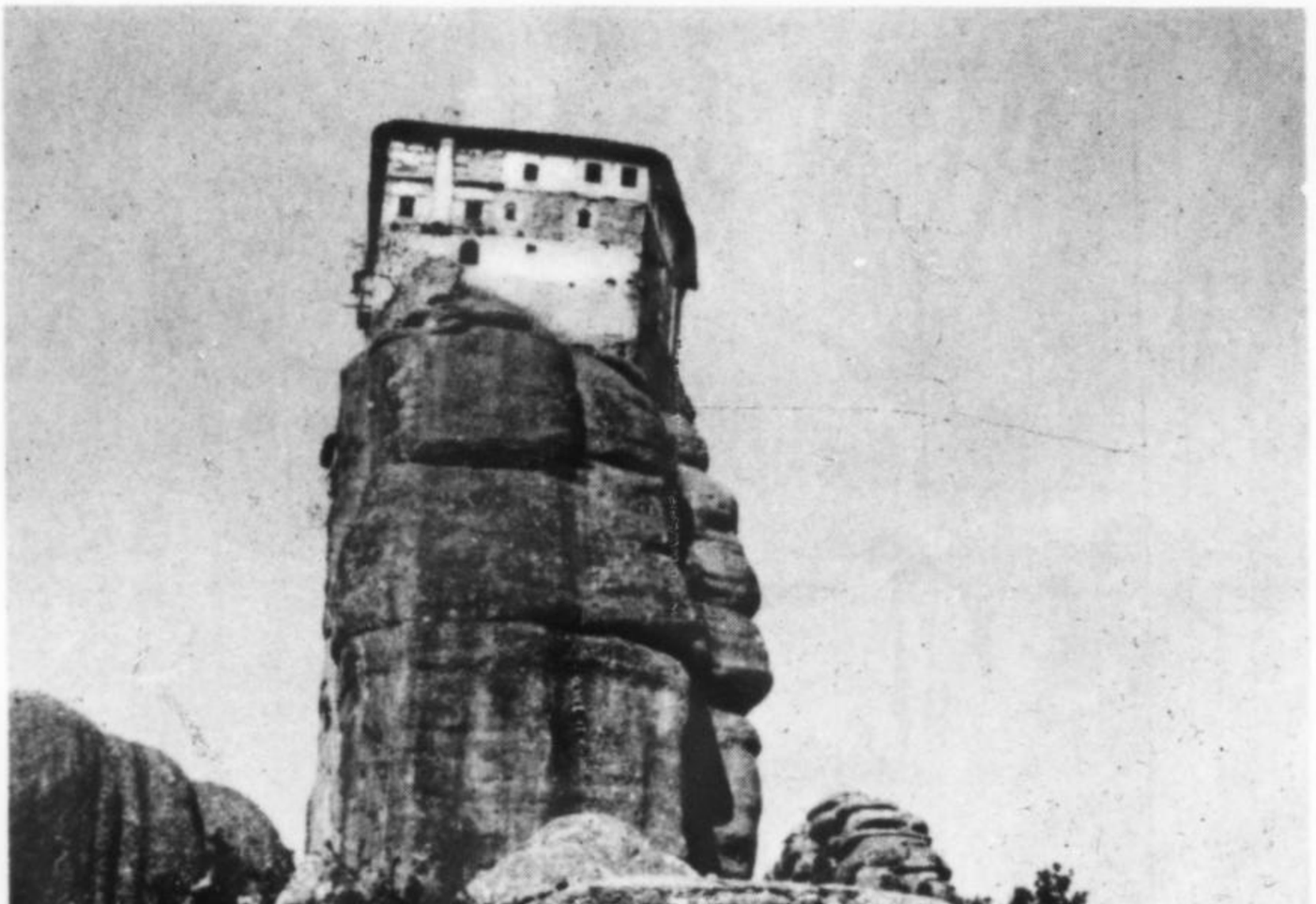
Asceticism was the ideal of the monks who made their homes on the hard rocks of the Meteora.

From the heights, they contemplated the vanity of human life far below them in the valley, while the blue sky, filled with the chanting of Vespers, inspired them with mystic joy.

THE METEORA

(Continued)

Stories from the lives of the saints—their martyrdoms and the miracles they performed—are painted in some of the monastery churches with a realism that is moving in its simplicity. Among the most remarkable frescoes are those at Varlaam, from which the painting of St. George in military habit (above) is taken. They date from 1566 and are the work of the painter Frangos Katalanos. Right typical high-perched monastery of the Meteora.



SIC TRANSIT GLORIA MUNDI — Sisoes, a famous priest of ancient times stands before the tomb of Alexander the Great and contemplates the mighty conqueror's remains with sadness—detail from a fresco at Varlaam. Inscription reads: "Sisoes, renowned among the ascetics, on seeing the exhumed body of the great and glorious King of the Greeks, Alexander, shudders at the thought of how glory decays with passing time; sadness overcomes him and he laments: "Oh death! Alas! who can escape thee?"

New industry in Iraq

The sugar bowl hidden in the date palms

by

Georges Fradier

Photos Roger Viollet

SCIENTIFIC experiments carried out under the United Nations Expanded Programme of Technical Assistance have paved the way for an important new industry in Iraq.

Iraq has been importing 80,000 tons of sugar a year; while, for want of a market, thousands of tons of Iraqi dates were allowed to rot. Then a Swiss expert sent by Unesco led the way in experiments to manufacture sugar from dates. As a result, Iraq is on the way to saving $16,000,000 annually spent for imported sugar.

As the result of the pioneer work of a Swiss scientist, sent to Iraq by Unesco, the country will soon begin the manufacture of sugar from dates, and some $16,000,000 annually spent for imported sugar can be saved.

For thousands of years, dates have grown in abundance in Iraq and have constituted the principal food for the people of the region and for desert dwellers generally in Asia and Africa. Iraq, in fact possesses well over 150 varieties and produces about 80 per cent of the world's dates. The date-palms are cultivated as lovingly as hot-house flowers by farmers who spare neither their wealth nor their labour. Sixty-five million palms line the banks of the Tigris and the Euphrates and sprawl out into handsome forests around Basrah.

Dates are the Bedouin's staff of life but, in Iraq, their influence is not merely economic. Iraqi poets sing of the date the way other poets under other skies write verses to fields of wheat, to vineyards or to olive groves. Your true connoisseur can distinguish 169 varieties of dates, some of them bearing such charming names as *ashqar,* the blonde; *asabiil arus,* the fingers of the fiancee; *saadah,* happiness or *ishaqi,* the lovers.

In a "good year", Iraq may harvest as much as 400,000 tons of the fruit. This should be a source of considerable wealth.

But in these "good years", date prices fall so low that distributors cannot even afford the luxury of moving the fruit to market—in Basrah you can often buy a ton of dates for 4 dinars ($11.20).

Despite progress in fruit preservation and in packing, which has helped date producers to gain a foothold in certain markets, they have been unable to solve what, at first sight, seems to be a permanent case of overproduction.

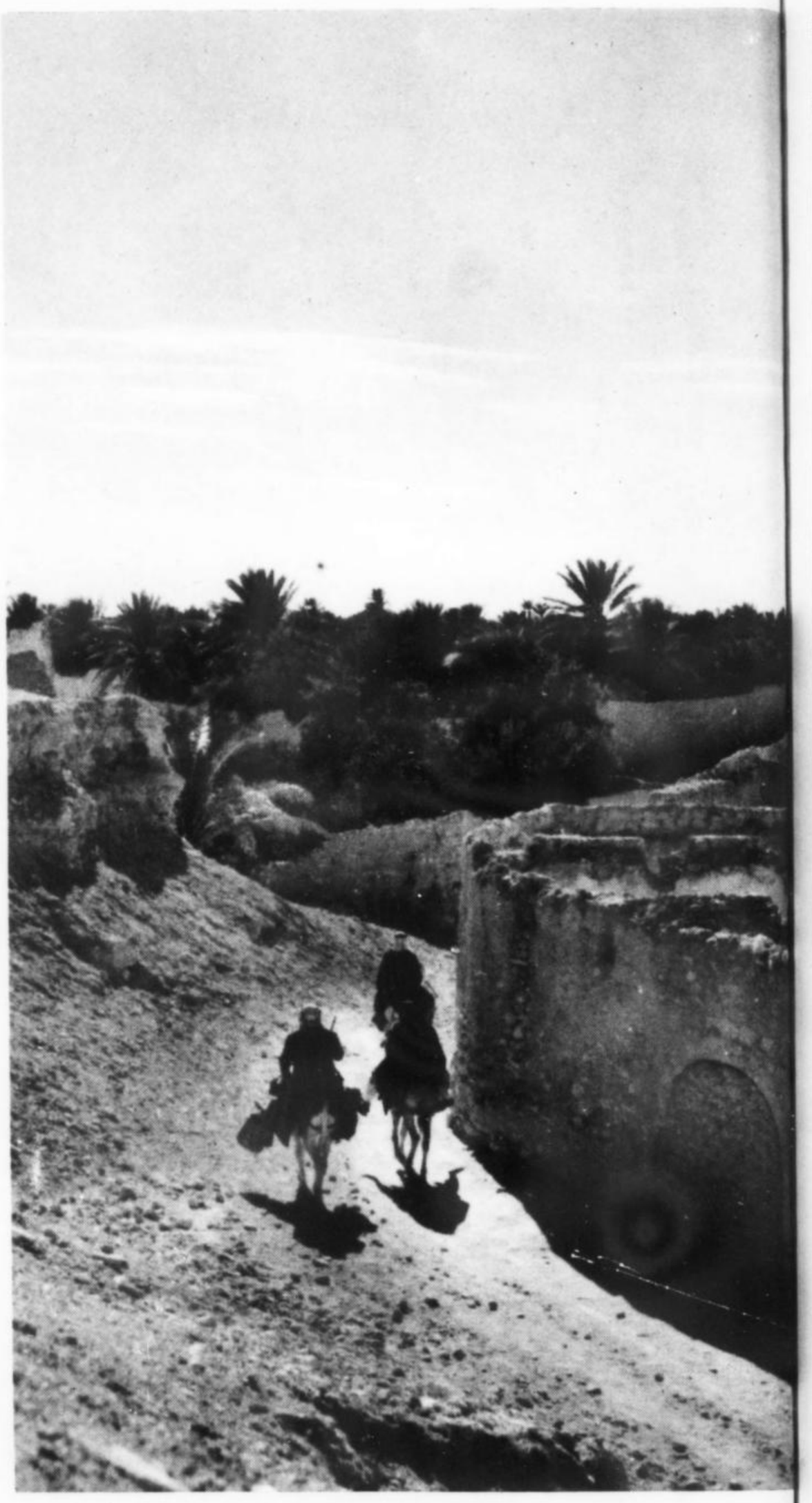
This situation has been a constant source of worry to the directors of Iraq's big fruit-producing company, the Date Association. Recently it also began to worry Dr. Herman Mohler, head of the Unesco team of scientists sent to Baghdad in 1951 to help

(Continued on next page)

The sugar bowl hidden in the date palms

(Continued)

Anyone who had visited Baghdad thirty years ago would have some difficulty in recognizing it from a present-day description. "A university at Baghdad?" he might exclaim, "An engineering school? Physics laboratories? Why, I remember Baghdad—it was an unhealthy town and not a very safe one." A visit today would change his ideas. Within a few years, a modern city with spacious avenues has replaced the swamps and the empty lots he knew. Iraq is no longer an old land with three-quarters of its territory lying waste, but a new country—and a rich one. The efforts of the Government, aided by the U.N. Technical Assistance Programme, have helped to give Iraq many new looks. One of these is the sight of students working in the physics laboratory of the Baghdad College of Science, under Professor Hermann Mohler (above). Professor Mohler, a Swiss expert sent by Unesco, initiated experiments to manufacture sugar from dates pointing way for a new Iraqi industry. Below, trunk of a date palm. (Photos Unesco and Viollet)



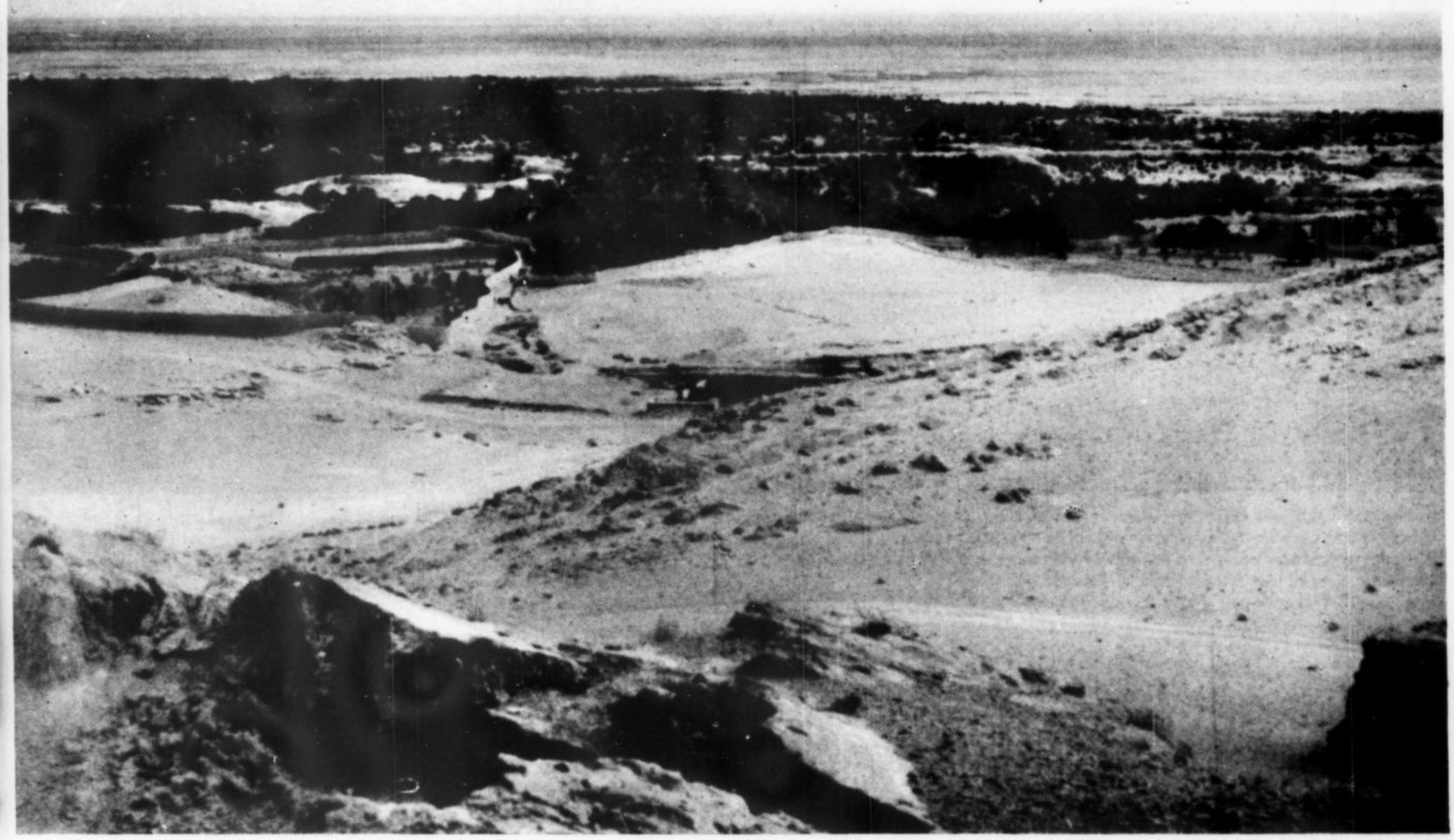
establish courses in natural science and to initiate research on a university level at the school which is emerging as the University of Baghdad.

Dr. Mohler learned that Iraq on the one hand was letting thousands of tons of dates rot for want of a market and, on the other hand, was importing more than 80,000 tons of sugar a year, at a price ranging from $196 to $244 a ton. He knew that the sugar content of the date is 81 per cent, although it is true that this sugar is not the pure saccharose extracted from the sugar cane or the sugar beet, but a compound of glucose and fructose. Date syrup might be extremely nutritious but it seemed useless for any practical purposes, for example in the manufacture of sweets, both from the standpoint of taste and the dark brown colour.

Still, a sugar content of 81 per cent—no matter what kind of sugar it was, looked impressive. Dr. Mohler was more impressed than a layman would have been for, as former

Sixty-five million date palms

Palm groves are a common sight in many parts of the Middle East, but they are exceptionally profuse in Iraq. Here, 65 million palms line the banks of the Tigris and the Euphrates in thin ranks, sprawling out in some places into handsome forests. Iraq has a rich variety of dates—nearly 170 kinds. (Photos Unesco and Viollet)



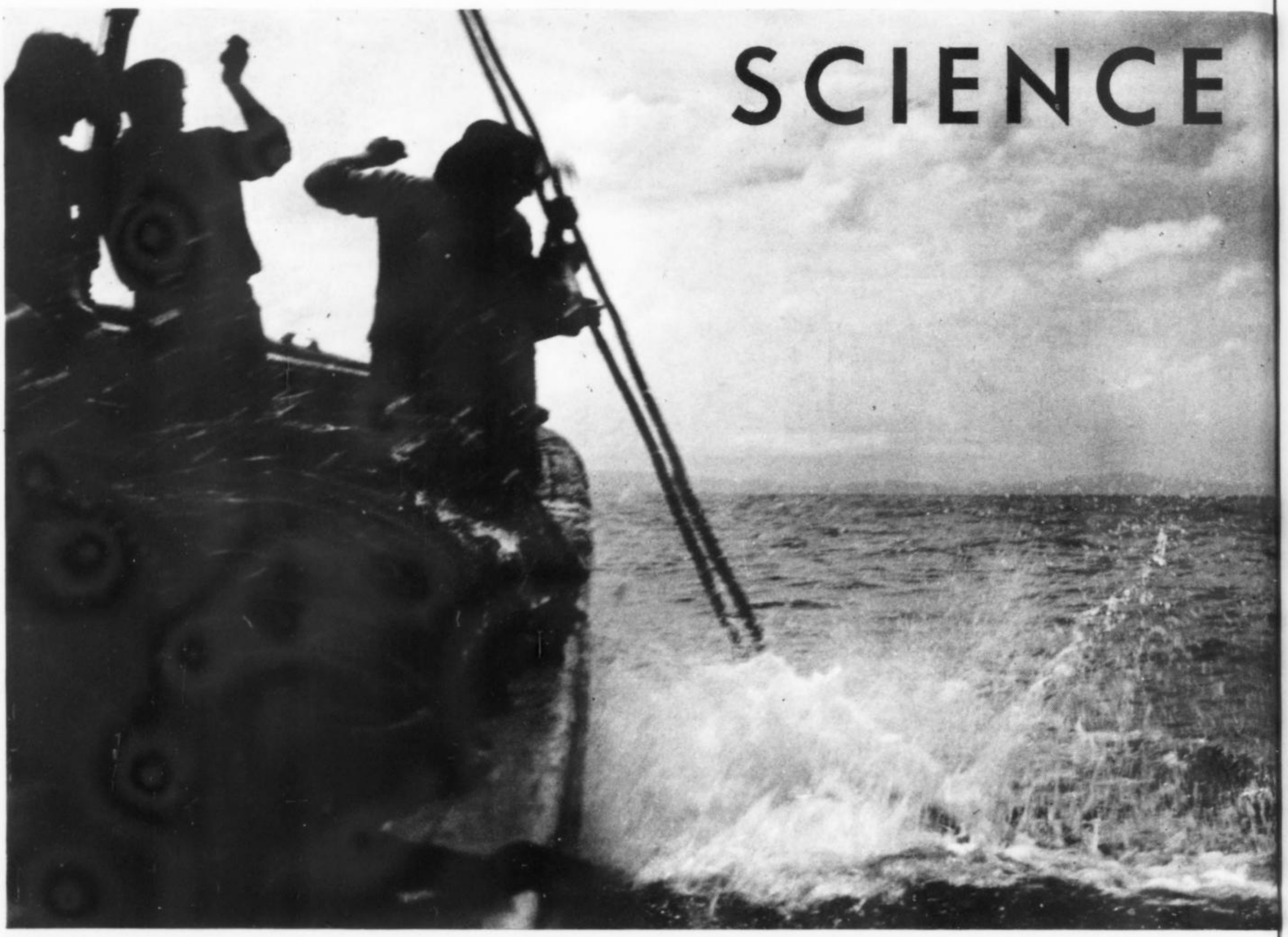
chief of Zurich's municipal laboratory, he was well aware of Swiss research during the Second World War on the production of fruit sugar. A few experiments in the laboratory of the school proved to his satisfaction that dates could be used on an economically-sound basis to produce a white sugar which no palate could distinguish from ordinary sugar.

This was heartening, but it wasn't enough. More conclusive experiments were required on an industrial scale. Dr. Mohler knew that the refining equipment he needed to carry them out existed in Switzerland. At his suggestion the Date Association shipped to Zurich three tons of fruit—and a few weeks later, Swiss laboratories sent back one ton of clear white sugar.

This new product was immediately distributed in Baghdad to manufacturers of sweets and to pastry shops. Its tests turned out to be a small-scale triumph: a few weeks later, an official reception was held in the capital and its guests were served cakes and sweets, all made out of "national sugar".

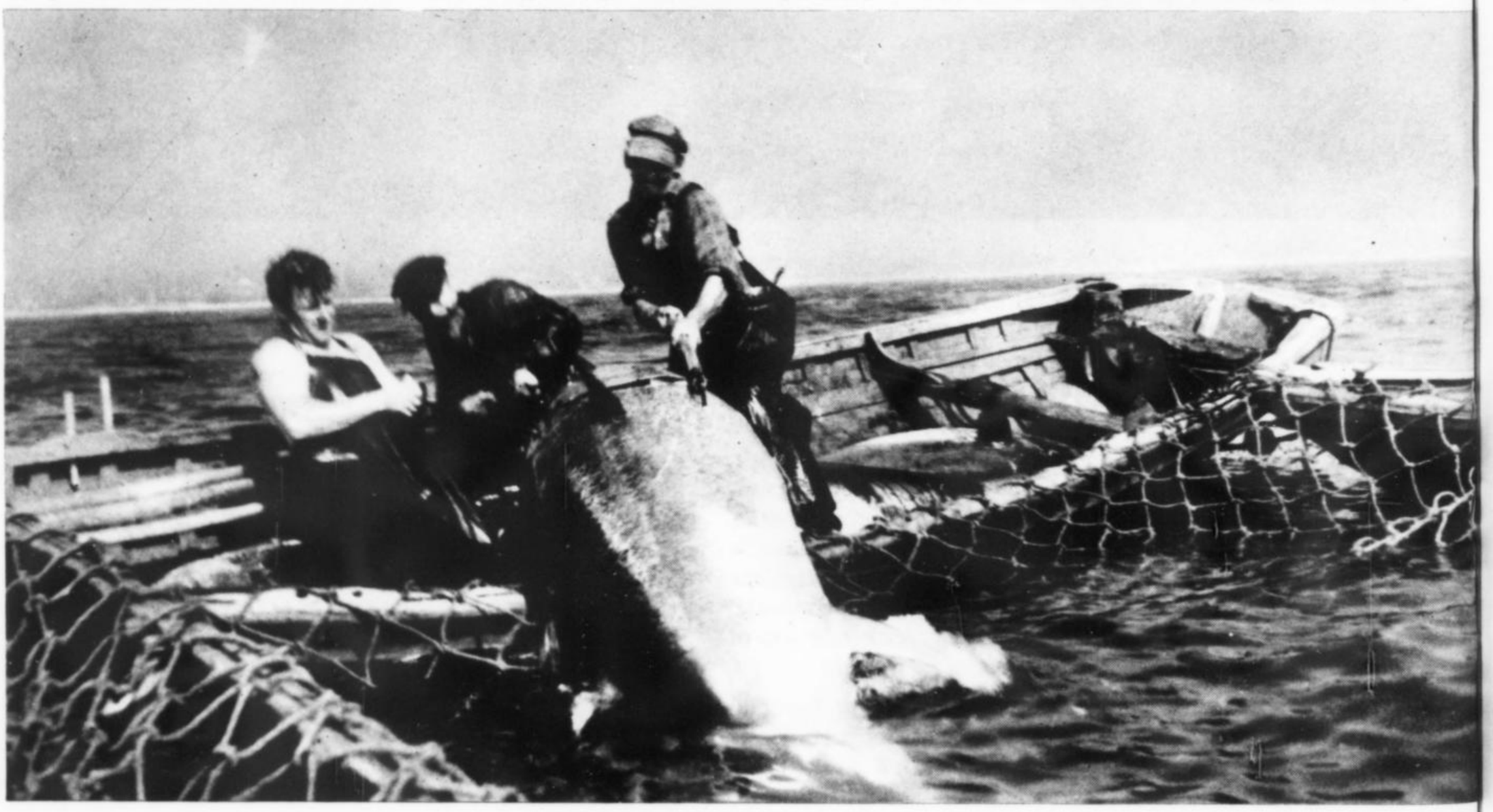
Since then, a company has been founded by the Date Association, the Agricultural Bank and the Iraqi Agricultural Fund to put the dates-to-sugar process on a business basis. Its first factory, now under construction, will be equipped to produce 9,000 tons of sugar a year. Dr. Mohler believes this factory will also be able to produce an inexpensive syrup which will provide emergency food in a period of famine. As for the by-products of the factory, the company's directors have already announced that they will be used for animal feed.

For the first time in history, it appears, Iraq will obtain the full benefit of its most precious agricultural resource. As for the technical assistance mission, it will have demonstrated once again the value of scientific research to economic progress.



SCIENCE

KING OF OCEAN GAME is the tunny, (also called the "tuna") unique among the important food fishes of the world because it is a truly oceanic fish, living, spawning and dying on the high seas. Scientists know little about tunny and their migratory habits, but what they do know suggests that here is a group which may comprise ultimately the most important food fishery in the world, for they are distributed in commercially important quantities over a greater area of the oceans than any other group of food fishes. Above, French tunny fishermen at work in the Bay of Biscay. Below, A giant tunny being hauled aboard by Nova Scotia fishermen. Tunny fishing is a new, thriving industry in Eastern Canada. (Photos Black Star-Rapho and Acme)



AND THE SEA

The mystery of the sea:

"To me the sea is a continual miracle —the fishes that swim—the rocks— the motion of the waves—the ships with men in them. What stranger miracles are there?"

The challenge of the sea:

"Faithful to no race after the manner of the kindly earth, receiving no impress from valour and toil and self-sacrifice, recognizing no finality of dominion, the sea has never adopted the cause of its masters like the land."

The men of the sea:

"The fishers shall mourn, and all they that cast angle into the brooks shall lament, and they that spread nets upon the waters shall languish."

THESE words—by Walt Whitman, Joseph Conrad, and the prophet Isaiah—express the three aspects of man's relationship with the sea that surrounds him; our relative ignorance of its character and resources; our difficulties in trying to exploit it for our benefit; and the penalties we may have to pay if we exploit it recklessly, without thought or understanding. These are the matters which concerned a recent international conference called by the United Nations.

All over the world and right through the year the conference table is in action. Any problem which crosses an international border may come to it. These issues and the decisions which are made affect and shape our lives.

Sometimes that may sound like a pretty extravagant claim—even though it's perfectly true in every case if we bother to trace the line from the conference table to our own front door. On this occasion, however, there's no difficulty. This recent meeting was held in Rome at the headquarters of the United Nations Food and Agriculture Organization (FAO).

Its subject is stated in rather formidable words: "An International Technical Conference on the Conservation of the Living Resources of the Sea." In other words, a number of experts from different countries got together to try and make sure that we can continue to get that fine fresh flounder for dinner any time we feel like it. Which would suggest that perhaps the fish in the sea aren't as plentiful as we imagine—or at least that we're consuming them at such a rate that a dangerous shortage lies ahead.

In a sense that's the way it is. For instance a British fisherman recently told a U.N. reporter : "I've been working on a British trawler in the North Sea ever since I was a boy. I can remember, just after the first world war, we used to take an average of over 30 cwt of fish every day. These days we think we're doing well if we take in an average of 13 cwt. And that, mind you, despite the fact that our fishing methods are better today."

Despite the fact? It is, perhaps, more accurate to say *because* of the fact. Dr. D.B. Finn, Director of the Fisheries Division at FAO, describes some recent developments in fishing technique and relates them to the matter of marine resources:

"Throughout early literature there are many references to the inexhaustible bounty of the sea," he says. "And indeed this opinion was shared by some of the early naturalists. Nowadays things are different. We can traverse in a few days stretches of ocean that formerly took us months and this makes distant fishing grounds much more accessible. We have taken submarine-detecting devices and turned them into fish-finding apparatus. There is hardly a modern fishing vessel afloat that does not have an echo-sounding device for locating fish. We now have the floating trawl, the Danish seine, and immense nets that a few years ago would have been impossible to handle and experiments are under way with an electrical method of fishing which would even eliminate a hook or a net.

SEAFOOD ESSAY on dietary value of fish is this Chilian schoolgirl's contribution to Government-FAO eat-more-fish campaign. (U.N. photo).

"All this has led to an increase in production. The most recent, and more accurate, estimates of FAO indicate that it was about 27 million metric tons in 1953. However, while it is estimated that the sea could, overall, produce more than it does there are nevertheless places in it where the return of fish caught no longer pays for the effort put into fishing. And so it is brought home that the resources of the sea are not inexhaustible in the economic sense. While it might be impossible for man by his fishing effort ever to exterminate fish he can, by over-fishing, so reduce the take that it no longer pays."

So what should be our approach to the problem? Obviously we're not going to abandon our very effective modern techniques and return to the idyllic methods of Isaac Walton who, despite the title of his famous book, was really a very incomplete angler. Millions of people in the world need more protein in their diet and they could get it from fish if we could assure a continuing, cheap, and abundant supply.

HEAVY LADEN with a record catch of sprats, a fishing boat ties up alongside the jetty at Concarneau, Britanny. (Keystone photo.)

One man who knows from spectacular personal experience how valuable the sea is as a source of food is Dr. Alain Bombard of France. In 1952, Bombard lived for weeks off raw fish, the tiny living organisms called plankton, and even the salt water itself, when he sailed in his open rubber raft "The Heretic" all the way from Monaco in the Mediterranean to Barbados in the West Indies.

Speaking on a United Nations radio programme a short time ago, Bombard said: "The problem for me was—can you survive at sea with only the products of the sea. And the results prove that the sea can give you to drink and to eat, and also a supply of vitamins."

Dr. Bombard's epic voyage made him an expert layman as it were, on the subject of fishing and marine resources, and from what he says it may be necessary to change the present pattern of fishing, under which we still have to *hunt* for fish. We may have to adopt a pattern under which fish are deliberately and scientifically cultivated.

Bombard said: "At present fishing is empirical—but now we must go about

SEA HARVEST, glistening and wriggling, is hauled aboard a deep sea trawler. Captain opens the mouth of the big net. (USIS photo.)

SCIENCE AND THE SEA

(Continued)

it scientifically. Fishermen are just like prehistoric men—and animals—merely searching. We must cultivate fish just as we breed cows, horses and ducks. But the big difficulty is to change the habits of men because fish culture will kill the fisherman. You must explain to him 'you must be now no more a fisherman like a hunter in prehistorical time but also a cultivator —a farmer.' That's difficult—the most difficult, I think. The scientists understand well but the fisherman... my goodness!"

But even if large-scale fish cultivation is accepted as an ultimate objective a lot of research will be necessary before it can become a practical undertaking. And the same applies even to the much more likely matter of conserving the naturally developed stocks of fish in the sea. At present we simply lack sufficient knowledge of the sea and its resources.

Tracking the tunny

Dr. Finn puts it like this: "Unfortunately there is far too little knowledge among the fishery biologists and scientists to make the answer easy or in some cases even possible. Great strides are being taken in the development of this knowledge by some countries. In others relatively little attention is being paid to it. But the fact that a specific fisheries reference was given to FAO by its member nations—the first time in history that a world-wide body has received such a reference—is a sign that more and more attention is being paid to the subject."

But what are some of the specific lines of research that must be followed? The migration habits of fish is one. We know a lot about the migrations of some species but in the case of the tunny (or "tuna"), for instance, which is perhaps the richest sea food of all, the known facts are few.

One of the technical papers presented by Unesco at the Rome conference was by the British hydrographer John B. Tait. "The temperature of the sea," Dr. Tait says, "exerts marked and often decisive influence on all fishes throughout their lives. It undoubtedly governs spawning and it has an effect on the development and growth of larval and baby fishes. Salinity—the salt-content of the sea—is another influence. It can affect not only the fish themselves but the various marine organisms on which they feed.

TV in the depths

THEN there are the currents of the sea both horizontal and vertical. They control the distribution of temperature and other physical properties of the sea on which all marine life depends. They control the dispersal of fish eggs and of the youngest fishes before they are able to swim under their own power. And there is the bottom of the sea itself— its structure and topography. Different species of fish favour mud bottoms, sandy bottoms, and gravel bottoms. Because of the technical difficulties involved in observing fish near the bottom we have, in the past, been severely handicapped. But now, with the development of under-water photography and television, there is promise of great progress in this aspect of marine investigation."

Dr. Finn summarizes these—and all the other considerations in this subject —like this : "All these problems have their technical and scientific side. It is a matter first of trying to measure the continuous forces which reduce a population of fish and then to contrast these with the other continuous forces that build up a population of fish."

One technical conference, of course, is not going to find the answers to all the problems. But there have already been several conferences—recently international organizations like the Pacific Science Congress and the Indo-Pacific Fisheries Council have called attention to the research that is still needed, and especially to studies that will increase the world's food supply—and there will be many more. And between conferences—all the time—practical research will continue to be done by individual scientists and scientific organizations in many lands.

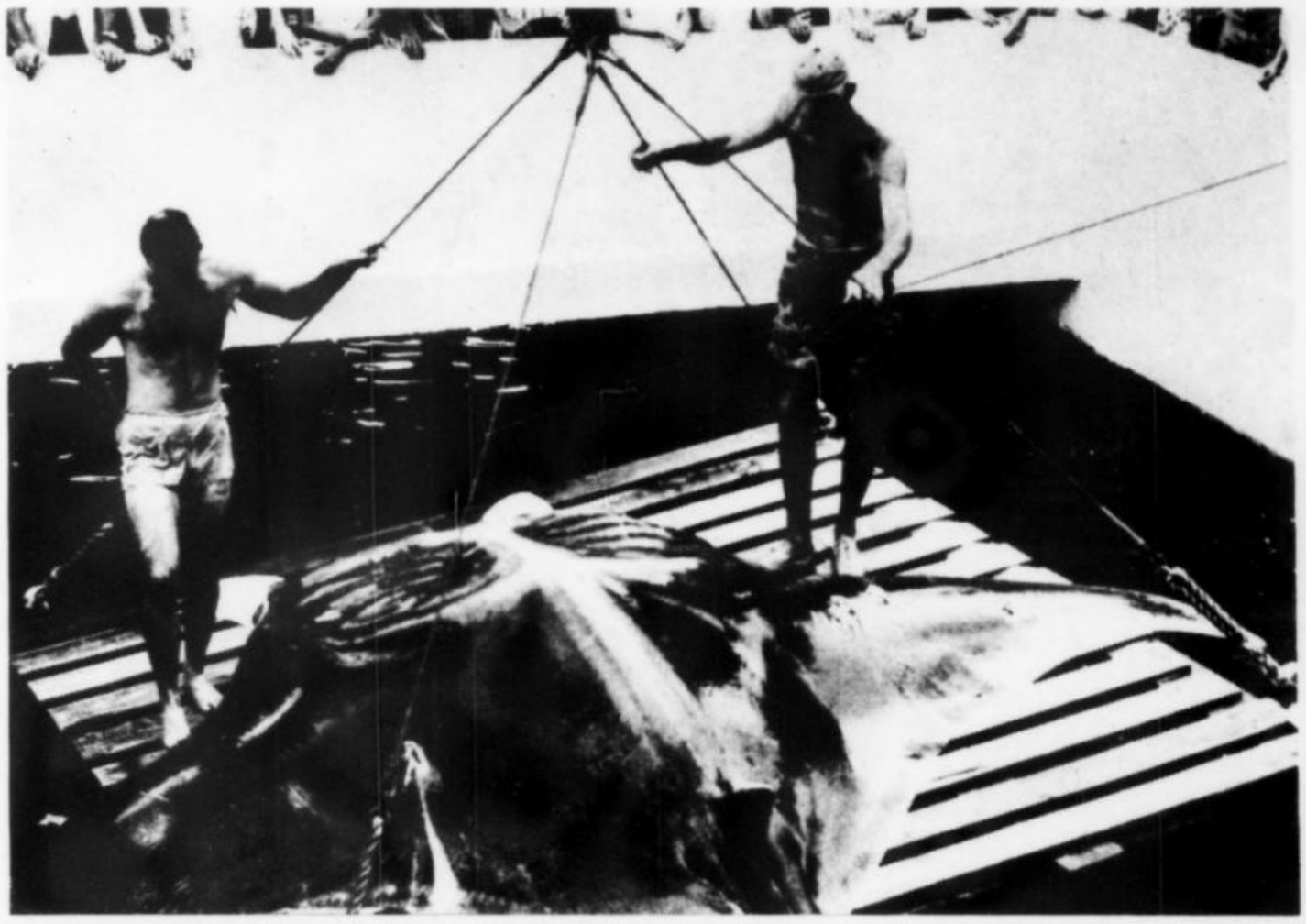
To help in this work the Natural Sciences Department of Unesco has now organized an Advisory Committee on Marine Sciences and Mr. J.A. Mussard, head of Unesco's Division of Scientific Research, has described its functions as follows: "One aim is to establish a bridge between the different disciplines involved in oceanographic research. The phenomena of the oceans are of a physical character, also of a chemical character, and there are other disciplines like meteorology which are also involved. And we think that some interesting results could be achieved if the research which is being carried through separately in these various disciplines is co-ordinated.

"The second aim is to mobilize science to find through scientific means the solution of practical problems which are being faced by the fisheries. And the third aim of this programme is to establish also a bridge between the under-developed countries, which rely very much on fisheries, but do not have the scientific equipment to develop this kind of research, and institutions in the scientifically advanced countries which could aid these underdeveloped lands."

FRENCH FISHERMEN cleaning a sea bass. These fish can grow to more than six feet in length. Their livers are a rich source of vitamins. (Office des Pêches Maritimes photo.)

ICELAND IS SURROUNDED by some of the richest fishing grounds in the world. Photograph shows salted cod, which has been cut and gutted aboard trawlers, drying in sun. (USIS photo)

A LARGE BARRACUDA caught on lines trailed by a cargo and passenger-carrying schooner plying among the Grenadine Islands in the Caribbean Sea. (Central Office of Information photo)



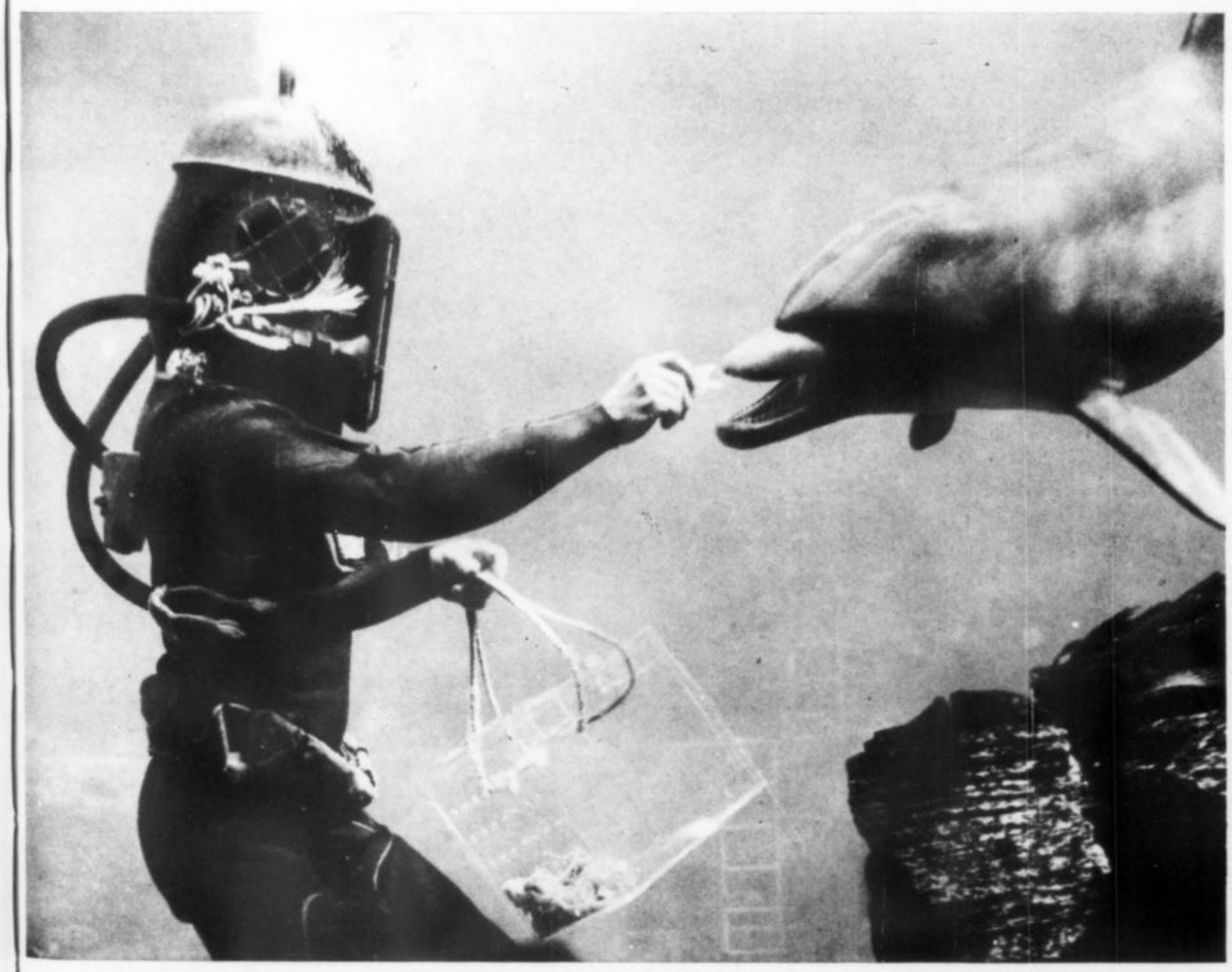
LOWERING A GIANT RAY into an aquarium tank. These immense fish can weigh as much as 1,500 lbs. and have a span of up to 10 feet or more. Expert fishermen are employed to catch them for aquariums. Contrary to general belief, the safest place to grab a sting ray is by the tail tip—the stinger is near the root of the tail. If its tail is held the ray cannot use its stinger. (USIS photo)

The Advisory Committee on Marine Sciences, which held a preparatory meeting in Rome early in May, will coordinate a co-operative, long term international research programme now being prepared under Unesco's auspices. This programme will include activities such as the mapping of the ocean bottom, study of the soils and sediments there, analysis of the ocean depths and waters in many areas, knowledge of the temperature variations and ocean currents, special characteristics of the shallow waters in bays and near rivers, the changes with the seasons and with the weather.

Also to be studied are the conditions governing plant growth, the types of animal life at various locations, depths and temperatures, the diseases and parasites of plant and animal life, and especially the methods for increasing the resources of edible fish in accessible areas and those nearest the great centres of population.

Thus, when the Advisory Committee meets for the first time in Tokyo next October, its members are expected to include specialists in physical and chemical oceanography, marine biology, geology, submarine topography and maritime meteorology as well as in the different kinds of oceans: arctic, antarctic, tropical and temperate seas, etc.

There is also a legal aspect of marine conservation. In fact, the conference on the conservation of marine resources held in Rome stemmed from the need of the United Nations International Law Commission for technical information to help it in its work of codifying the law of the high seas and of territorial waters. Fishing rights have always been a rather complicated legal matter and history records numerous disputes between countries over where and where not their respective fishing fleets may cast their nets.



THE PORPOISE is a friendly creature. Here at an oceanarium on the southern Californian coast one of them is fed by hand. It appears to need no lessons in "showmanship" (Black Star photo)

Close to anarchy

One of the Law Commission's proposals is that an International Fisheries authority should be established within the framework of the United Nations. In its report to the last General Assembly of the UN the Commission said: "The task of this proposed authority would be to set up, at the request of any interested state, systems regulating fisheries in any given area of the high seas for the purpose of protecting the fishing resources of that area against waste or extermination. There is an urgent necessity for international legislation on the conservation issue. This is significant of the present state of opinion, and of the widely felt need for the removal of what is considered by many to be a condition approaching anarchy.

So the prospects are hopeful—both for the survival of fish in the sea and for all of us who like to have some on our plate now and again. As Dr. D.B. Finn has summed up the situation: "It is quite within man's technical ability to arrive at a state where he has sufficient knowledge to treat the sea as he does his farm land. Then, instead of hunting the wild stocks of the sea in a random fashion, he will be able to manage his take of the crop so that he may achieve its full abundance."

STRANGE FACTS ABOUT NEPTUNE'S REALM

EVERYONE knows that fish breathe through their gills but not so many people know that there are fish which have both gills and lungs and can live either in water or on land according to circumstance. These fish are known as dipnoi and it may be that the transition from aquatic to terrestrial existence was first made by animals of this type.

Walking on the sea

IN the Sargasso Sea in the North Atlantic ocean a sea slug spends much of its time crawling under the waves, much as flies walk on the ceiling. The body of the slug clings to the sea's surface by capillary action. It is admirably camouflaged as the upper part of the body which is turned to the sky is blue and, therefore, birds cannot distinguish it. The underside is white and is thus unseen by fish. Were it not for this protective colouring it would not survive.

Tree-climbing fish

THE anabas, or climbing perch, lives in the swamps of South Asia (India, Malaya and Indochina). This strange fish can crawl over dry land for several hours and can climb trees with the help of its fins.

Cure for malaria

TWO types of fish, called the guppy and the gambusia, feed mainly on mosquito larvae which they find on the surface of the water. As they devour enormous quantities of larvae they have been acclimatised in many parts of the world to help in clearing mosquito infected areas.

Longevity champions

THE age of a scaly fish can be determined by examination of its scales, in much the same way as the age of a tree is calculated by the number of concentric rings in a section. Contrary to popular opinion it seems that no fish reaches the age of 100. Carp may live from 25 up to a maximum of 50 years and two sheatfish were known to have lived for more than 50 years in England. The pike is also a long-lived fish. On the other side the stickleback, a European river fish, lives for less than two years.

Wanted—a Jonah

THIS strange piece of research was conducted with a view to discovering a new method of preserving whale meat. A British physiologist decided that the only sure way was to swim up to a whale which was preparing to surface for the last time and plant a metal recording thermometer in its stomach. This odd task was successfully accomplished and it was found that when sea water was allowed to enter the body of a whale the meat was better preserved and the flavour improved. The method was later adopted by whaling crews.

Duels in the deep

WHEN the sperm whale, which may weigh anything up to 70 tons, hunts the giant squid a conflict develops which, for size, is unmatched in the world. The squid is sometimes over 30 feet in length and its tentacles measure another 20 feet. It usually lives 1,500 feet below the surface of the ocean and the sperm whale plunges to this depth to hunt and fight it. No man has ever witnessed the undersea duel between these two monsters, but when sperm whales are caught, the scars of wounds inflicted by the squid's suckers are often seen on their backs and fragments of squid are found in the whale's stomach.

by François Le Lionnais

A male gives birth

THE sea horse is a curious little fish which has a head like a horse and a body resembling a caterpillar. It belongs to one of the few species of living creatures which pregnancy is the function of the male and not of the female. At the moment of impregnation the female lays her eggs in a pocket situated in the stomach of the male. The gestation period is two months and to judge by the contortions which accompany it the confinement of the male sea horse is apparently as painful as for any other female.

Fertility record

THE fertility of certain fish is phenomenal but there can be no question that the record holder is the turbot which can lay up to 12 million eggs at one time. Obviously the majority of this offspring cannot hope to find food and are thus condemned to disappear before they can reproduce themselves. However, if the world turbot population were a hundred times greater than it is there would be an appreciable addition to the human food supply.

Sexual habits

DIFFERENCES between the sexes are frequently more striking in fish than they are in mammals. For example the male ceratiae can only exist by attaching himself to the sides or the head of the female. Eventually the male becomes firmly fastened to the female and cannot be removed without tearing the tissue. Usually each female carries two or three males. A similar phenomenon is found with the deep sea fish, the photorynus spiniceps, where the male spends his entire life attached to the female like a small horn on the forehead.

Sexual differences are even sharper in the lower animal species such as the bonellia, a worm which is found off the European coasts. The female may attain, when extended, a length of over six feet. For a long time investigators were unable to discover any males of the species, but about the middle of the nineteenth century it was found that the male, which only measured from 1/25 to 1/12 of an inch in length entered the mouth of the female, made his way towards the middle of her body and lived thereafter as a parasite inside his mate.

Seas and oceans : a few figures

THE seas and oceans occupy approximately 72 % of the surface of the globe. In terms of statistics the overall area is about 200,000,000 square miles of which the land mass occupies some 56,000,000 square miles (including rivers and fresh water lakes) and the seas and oceans take up the remainder. The average depth of the seas and oceans of the world is something like 12,000 feet, but this can only be an approximate figure as large ocean areas in the Arctic which lie under the ice have not been systematically explored in depth.

Although only 2 per cent of the land

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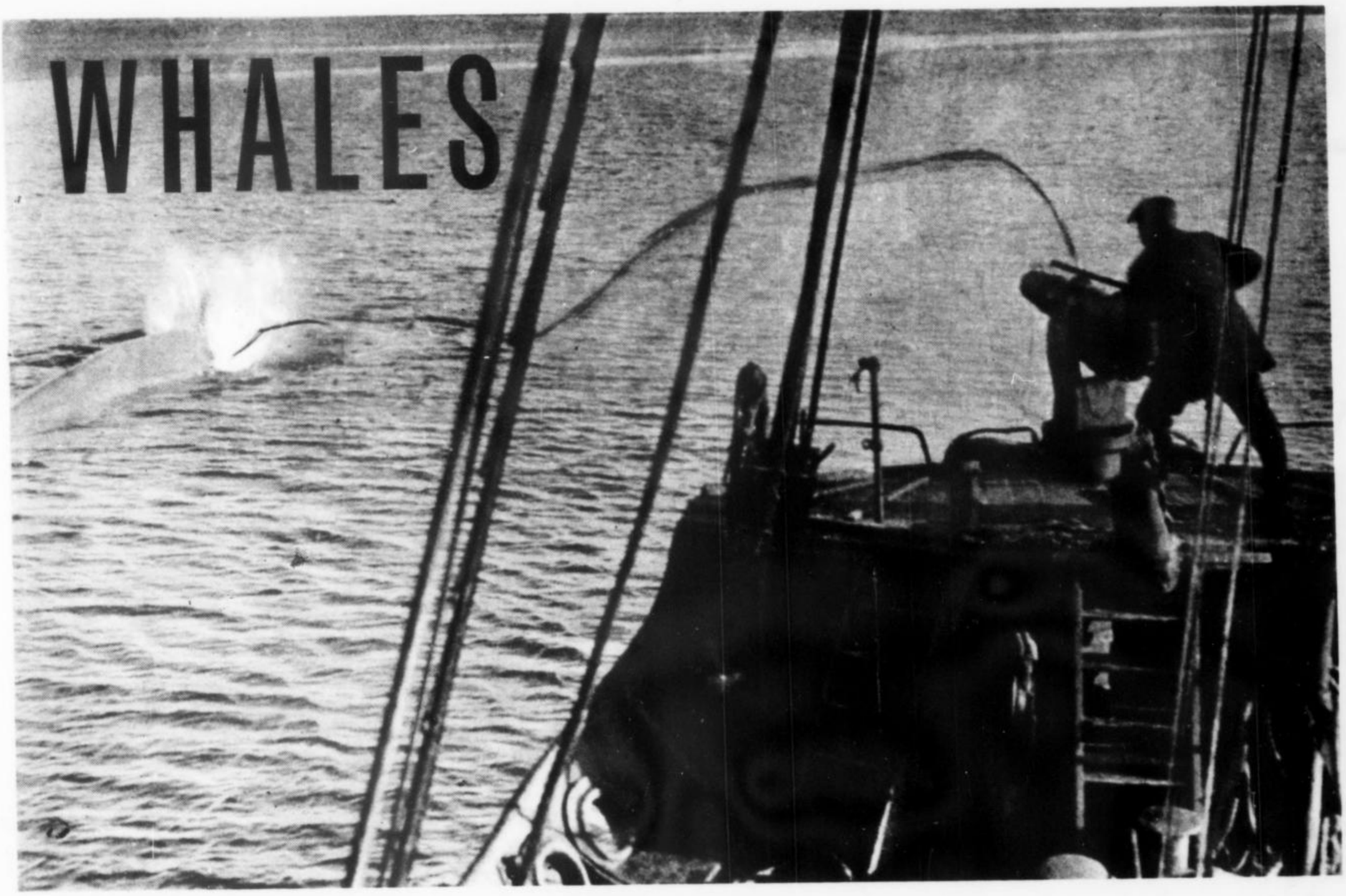
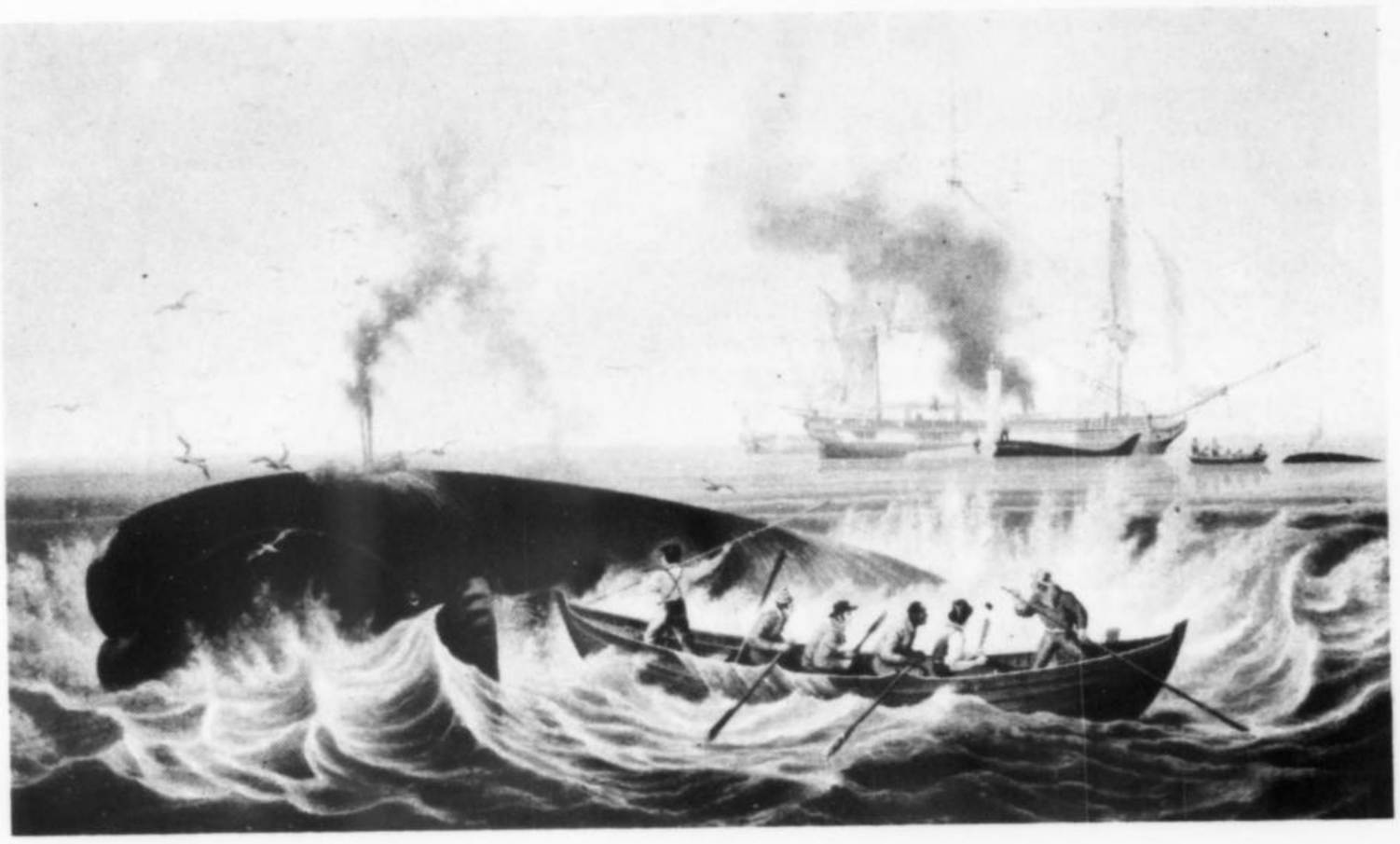
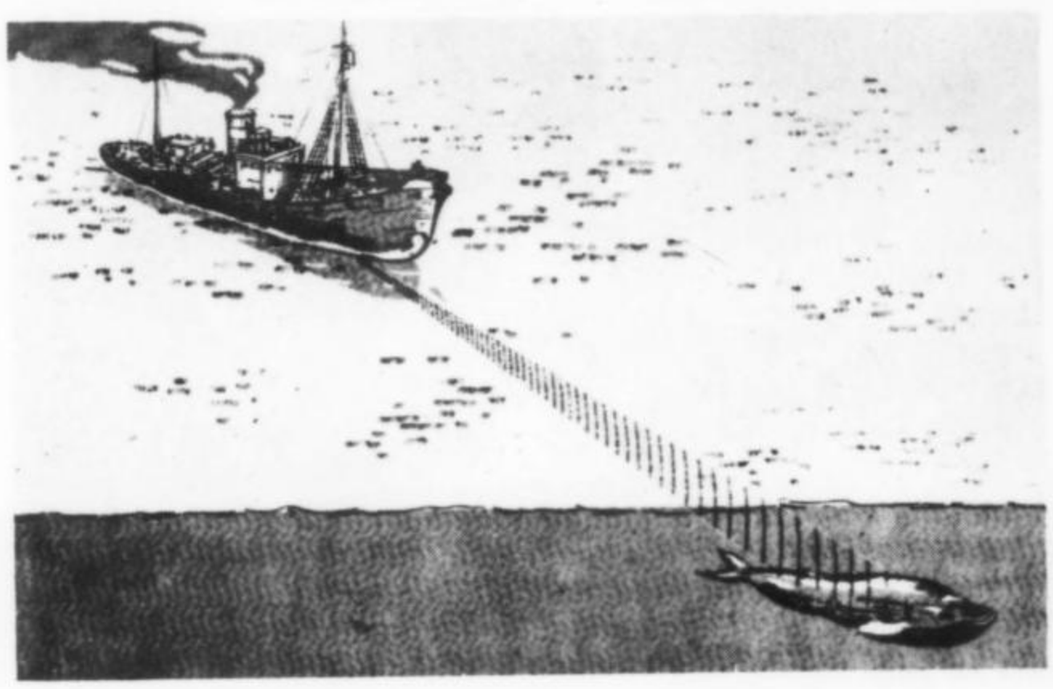
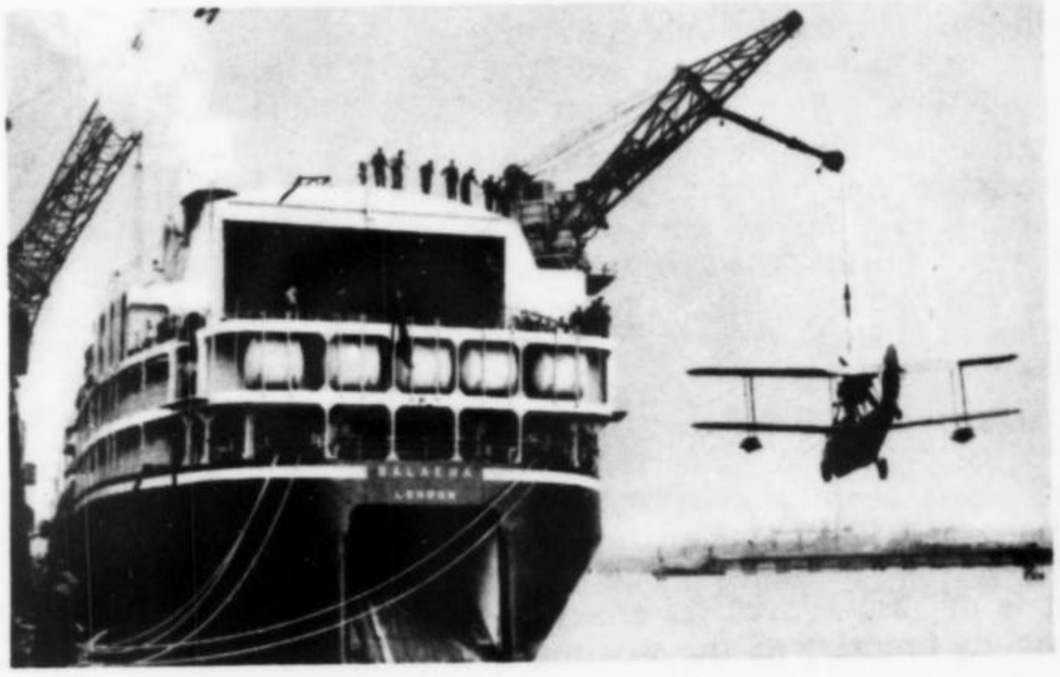


Old vs. New

Hazardous hand harpooning from a four-oared boat is depicted (left) in this early nineteenth century French print. Above the modern method: one man and a harpoon gun. To get into position for firing the catcher ship makes use of a device working on the asdic principle which gives the whale gunner a continuous account of the unseen whale's movements. Below, a spotting seaplane is loaded on a giant factory ship. More recently use has been made of helicopters—more effective for sighting and easier to stow away (Unilever's magazine "Progress", Keystone and Norwegian Foreign Information Office photos)







HUNTING THE WHALE

by David Gunston

WHALES have been hunted for something like ten centuries but only within living memory has there been a scientifically organized whaling industry. The whale has been aptly described as a mammal with an unfortunate economic background. The larger species are extremely valuable, and as they are free and wild they are not subject to any form of international control. Thus they became the goal of quick profit seekers. Only recently was effective protection introduced, but not before unbridled exploitation had led to serious depletion of world whale stocks.

The history of the whale since about 1600 has been a tragic story and species after species have been completely wiped out. First the whalers caught their quarry from the shore, then offshore, and finally throughout the oceans of the world, often thousands of miles from their home base. Only a hundred years ago whales were being caught off the Scottish coast and in the North Atlantic. Hull on the east coast of England was once a busy whaling port. But gradually whales diminished in the off-shore waters and towards the end of the nineteenth century it looked as if this type of whaling was coming to an end after a brief heyday.

New lease of life

IN 1904 the Norwegian whaling captain, Abraham Larsen, gave the industry a new lease of life, and in consequence the hunted whales a much smaller chance of survival. He opened up new whaling grounds in the icy waters bordering on the South Polar land mass. By the use of modern ships and new techniques he hoped to have an endless supply of whales for the taking, but the blue and fin whales which he found were only the remnants of a one time enormous world whale population.

Antarctic whaling was largely pioneered by the Norwegians but other nations soon joined the whale hunt. However, in 1912 when the world's whaling fleet had 141 factory ships, no fewer than 37 sailed under the Norwegian flag.

In the years prior to the first world war, and in the years following the war, whale hunting in the Antarctic was unrestricted and an international free-for-all prevailed. The economic crisis of 1930-31 had its effect on the whaling industry as the whaling fleet's record catch coincided with falling prices and heavy losses were incurred. More serious than this, however, were the grave inroads made on world stocks by unrestricted whale hunting.

Cosmetics and hormones

AT the commencement of the second world war in 1939 the world whale population reached its lowest ebb. Even so, the remaining whale population is still a valuable economic resource and the industry which turns whales into food and raw materials can ill be spared. This knowledge has not, nevertheless, prevented the hunting and killing of all species of oil-bearing whales with the result that they have been driven, if not to the verge of extinction, then at least to a dangerous economic level. Only three or four species now survive in any numbers.

The main targets today among the remaining species are the enormous blue whale—equal in weight to 17 elephants and the largest animal the world has ever known—the slightly smaller fin whales and an occasional sperm whale. Although oil remains the principal object of whaling there has been a great increase in the number of by-products and these account to a large extent for the mammoth size of a modern floating factory which costs in round figures about three million pounds sterling (approximately nine million dollars).

In the world to-day there is an urgent need for fats, especially edible ones, and this situation is likely to remain for a long time to come. Prior to the 1939-1945 war whales provided about 3 % of the world's edible oil production. Though this figure has now risen to about 10 % it is still only a marginal source of supply and is liable to be superseded in the future by vegetable oils, and possibly by synthetic products.

Whale oil is at present used in making margarine, cooking fat, cosmetics, lubricating oils, soap and many other products. At a price of around ninety pounds sterling (approximately 270 dollars) a ton it is assured of a ready market. Whales also provide valuable by-products such as hormones, insulin, meat and bone meals, fertilisers, poultry and stock feed, vitamin extracts and whalebone for brush making.

In recent years there has been a

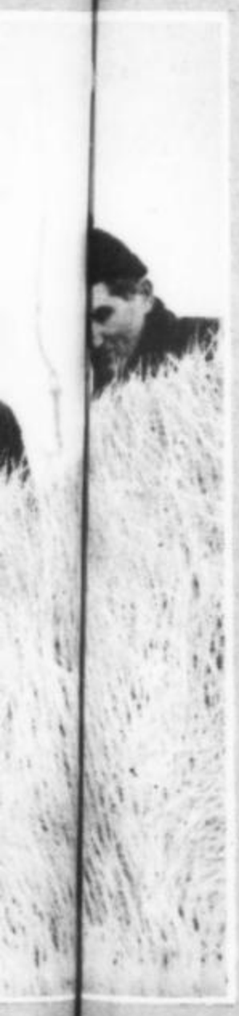
(Continued on page 20)

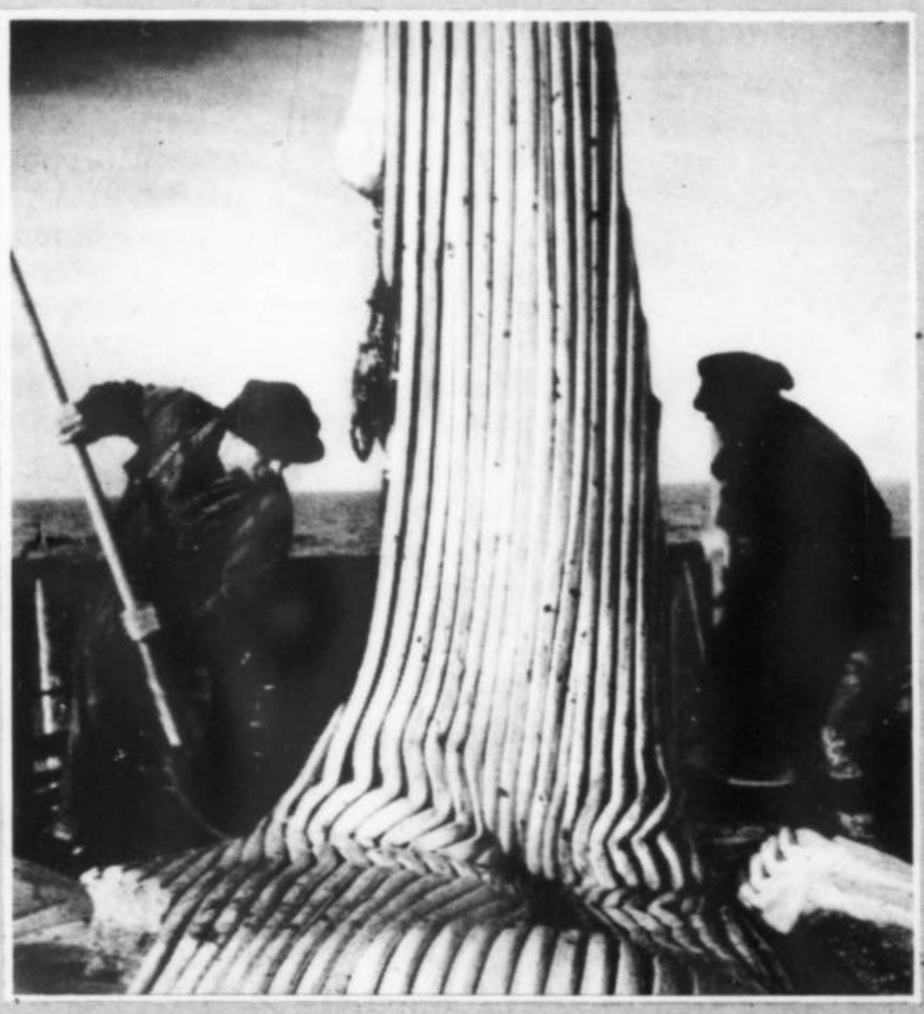
CAPTURED WHALE carrying a marker harpoon the flag of the ship and two small oil lamps. (Keystone)

FACTORY SHIP CREW IN THE ANTARCTIC

harpoon the house
Keystone)

STRANDED on a beach in Long Island (USA) a whalebone whale reveals his enormous mouth. Whalebone, or baleen whales, are named for the flexible baleen or series of thin plates to scoop up food which hang in parallel rows on either side of the mouth (Keystone photo)





TARC WORKING ON WHALE CARCASS IT ONLY TAKES ONE HOUR TO DISPOSE OF A GIANT BLUE WHALE. (Black Star Photos)

HUNTING THE WHALE *(Cont'd)*

Vanishing Quarry

growing demand for whale meat. Previously hundreds of thousands of tons of meat, after the oil had been extracted, were thrown back into the sea as useless. In fact whale meat has the highest protein content (85 %) of any edible meat and provides a staple food for the whalers themselves and other peoples such as the Eskimos and the Japanese. Attempts were made to popularize whale meat on the British market but these did not meet with much success and in common with another fish, the snoek, whale steak became rather a music hall joke. Recent research has improved methods of preserving and processing whale meat and it may yet prove to be of importance in the industry.

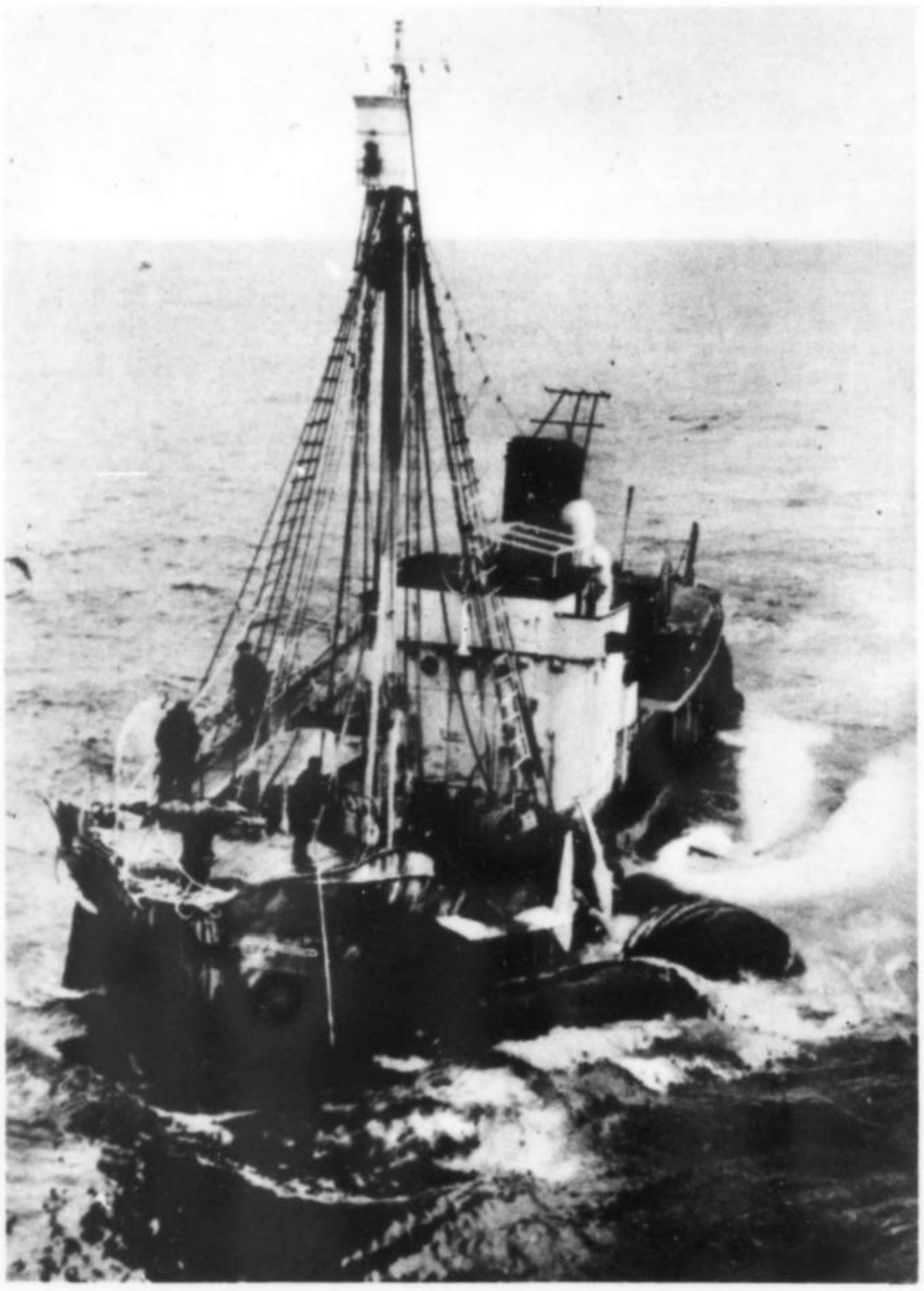
To gain a good idea of the present status of the whale fishing industry it is necessary to trace some of its recent history. With the opening-up of new fishing grounds in the Antarctic, the increasing scope for development and the perfection of the open sea whaling technique, the industry was a highly profitable one until about 1930. The old-fashioned methods of hunting from shore bases in South Georgia and the Falkland Islands were dropped and the factory ship, which processed whales far from land, and acted as a parent vessel for small tuglike catchers, came into its own. South Africa became the jumping-off point for the whaling fleets, and today tankers from South Africa feed the fleets thus enabling them to stay at sea for several months.

But the ocean could not be expected to go on yielding liquid gold for ever. Too many countries were sending whaling fleets to the Antarctic and the mad scramble for returns which ensued soon had its effects. Attempts were made by Norway and Britain to keep the total annual catch within reasonable limits, but these were not successful. Further new whaling fleets appeared in the fishing grounds with the result that more and more ships were catching fewer and fewer whales.

In the 1930-31 season some 40,000 whales were killed for an oil yield of 564,000 tons. By the 1938-39 season the size of the whaling fleet had more than doubled but the yield was only 13 % higher : 46,000 whales were killed for a return of only about 550,000 tons of oil.

Following the outbreak of war in 1939 the whales were left to themselves. But nature was not to be hurried, and the long ravaging which had taken place since 1904 had by no means been made up when the whalers returned in 1945 to resume their work. As most of the British and Norwegian factory ships had been sunk during the war it was not until the 1947-48 season that a fully-equipped whaling fleet once again set out from Europe. Weather conditions were good during that season and 31,000 whales were taken for a yield of 302,000 tons of oil. Since that time catches have been high and oil production good.

In efforts to restrict the annual slaughter of whales International Conventions designed to fix a maximum annual target were signed in 1944 and 1946 by those countries interested in the whaling industry. These conventions imposed a total limit of 16,000 "blue whale units" for the entire Antarctic whaling fleet in one season. The blue whale is used internationally as the standard measurement of whale catches. One "blue whale unit" is equivalent to one blue whale, two fin whales, two and a half humpback whales or six sei whales.



A RUSSIAN whale catcher bringing her haul of whales back to the factory ship. This Russian whaling fleet, during one Antarctic season caught a total of no fewer than 3,092 whales. (Keystone photo).

Industry's last chance

THE maximum catch figure is controlled on the whaling grounds by means of a floating headquarters. Here the day-by-day catches are totalled and announcements are given regarding the closing of the season when reports indicate that the limit of 16,000 is in sight. Despite this international whaling agreement there are many people who believe that the maximum catch is still far too high to allow for the future safety of the whales.

The great cost of building and equipping a whaling fleet today has tended to limit the number of new countries sending whaling ships into the Antarctic. At present Japan, Norway, the Netherlands, South Africa, the U.K. and the USSR send independent fleets to the far south for four or five months of the year. An International Whaling Commission has been established and agreement has been reached on many technical points.

All measures of international control are of the utmost value and the guiding principle of such control must be to restrict the annual catch to the approximate surplus of nature. This is not, of course, easy to judge and in the absence of precise knowledge safety would appear to be the best policy.

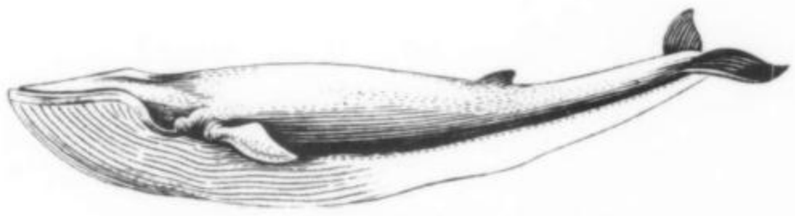
The potential value of the world whale population is now universally recognized ; all that remains is a realization of the need for care in its handling. Certainly one lesson cannot be forgotten : in every area with the exception of the Antarctic, whales have vanished through lack of foresight in not controlling the numbers of whales killed. The industry—and the world—cannot afford to let it happen again, for this would be the last time.

One whale equals seventeen elephants

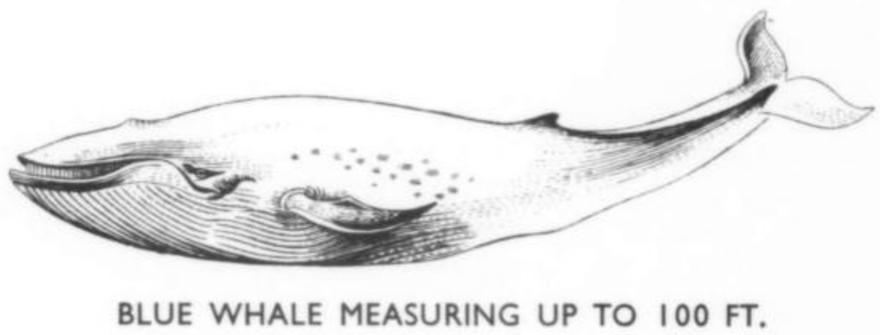
SEI WHALE MEASURING UP TO 56 FT.

SPERM WHALE MEASURING UP TO 65 FT.

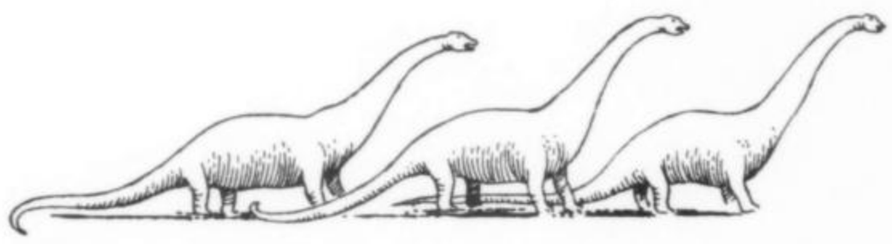
HUMPBACK WHALE MEASURING UP TO 65 FT.



FIN WHALE MEASURING UP TO 90 FT.



BLUE WHALE MEASURING UP TO 100 FT.



As shown above the giant blue whale, the largest animal the world has ever known, is equal to 3 dinosaurs, 17 elephants, 133 oxen. (Courtesy "Progress", the Unilever magazine)

MIGRATING MAMMOTHS

SCIENTISTS PLAY TAG WITH ANTARCTIC WHALES

by Paul Budker

Assistant Director, National Museum of Natural History, Paris.

CROSSING the waters of the southern latitudes during the month of October the surface of the long ocean swells will be broken here and there by the sudden appearance of giant black humps shooting clouds of spray high into the air. These humps betray the presence of vast underseas hulks of hundred ton whales. At this time of the year the whales are on the move southwards to their summer feeding grounds in the Antarctic seas. This whale migration occurs regularly every year, and to enable scientists to study the fascinating story of the whale's life many of these ocean mammals which pass by will carry, embedded in the flesh below their immense dorsal fins, a thin steel cylinder engraved with essential scientific data concerning their first contact with man.

This amazing story of scientific detection is only today revealing the surprising history of the controlled mass movement of whales, to and fro, from the tropics to the poles : a continuous rhythm which has, without doubt, been carried on in the same way for centuries past. However, it is only since the beginning of the present century that precise facts have come to light on this previously unknown pilgrimage across the oceans of the world.

Summer dining room

EARLY in January the whales have arrived in their summer sea pastures and the whaling season opens. In whaling parlance Antarctica comprises the entire area from the South Pole northwards as far as latitude 40 south. It is here in this vast expanse of ice and ocean, among some of the most inhospitable waters in the world, that the whalers hunt and pursue their prey. Each year at precisely the same time the fleets arrive on the edge of the ice floes, and each year the vast schools of whales keep an exact rendezvous with their killers. In some ways it is a tragic story of man's inhumanity to an inoffensive denizen of the ocean depths.

What is the impulse which drives the whales southwards year after year? They come down to the Polar Seas for a specific purpose. As the pack ice retreats southwards with the coming of warmer weather, the ice floes break up and the temperature of the water rises above freezing point to about 35 degrees Fahrenheit. For the Antarctic wastes these are summer conditions and a tiny shrimplike creature (Euphausia superba), popularly known as krill thrives in them. These minute organisms move along in million-strong masses.

The krill might well be described as the whalebone whale's *bonne bouche* and every summer hundreds of tons are consumed, or rather sifted through the whalebone filters of the Blue and some other species which do not possess teeth.

(Continued on next page.)

MIGRATING MAMMOTHS

(Continued)

The Antarctic in the summer season serves as a vast dining room for the whale schools. When the whales arrive from the northern tropical waters they are "lean" and hungry, but after a diet of krill they fatten out and put on a few tons in weight in preparation for the long journey before them.

In March and April, when the weather in the Antarctic begins to grow cold and the autumn gales start to sweep across the ice pack the whales begin to turn their noses to the north and head for the tropic seas. This is their honeymoon period and they move into the balmy equatorial waters to mate. From April until October the whalebone whales are to be found cruising usually in couples in the tropical waters. The vast schools have been dispersed and there is enough evidence to show that they practise a type of seasonal monogamy. Not only is their mating carefully organized but tropical whaling stations have established that throughout this period the whales do not consume any food at all. Numbers of whales, mainly of the Humpback variety, have been examined and their stomachs have been found to be quite empty. It is generally supposed that the whales live throughout this mating period on the reserves which they have accumulated during their long feast of krill in the waters of the Antarctic.

As the month of October approaches a new impulse makes itself felt, and the whales gather together, and, driven by an internal rhythm which governs their wandering life, once again begin their southerly peregrination towards the Polar Seas. On their next journey northwards to the tropics the mother whales will give birth to the infants which were conceived in the same warm waters 11 months before. The full cycle will have been completed.

Bachelors on the prowl

THAT is the story of the migration of the whalebone whales, but the ivory toothed sperm whales have a very different saga. These sperm whales maintain their permanent headquarters in the tropics where they lead a somewhat dissolute existence. Notoriously polygamous, each male usually cruises in company with a harem of females while on the outskirts of the group prowl the marauding bachelors.

Few sperm whales make the long journey down to the south, and those that do are usually solitary males who have been ousted by their younger and more vigorous rivals, or else hermit-like types who decide to forgo the pleasures and vanities of the balmy equatorial waters and seek consolation in a sterner life in the glacial waters of the south.

To garner the data which was essential for any study on the migration of whales it was obviously of the first importance to establish some system of checking or control. While it was easy enough to ring or mark birds and small fish, such a procedure with a hundred-ton whale posed a very different problem. To catch a whale without injuring it, to fix a mark and then to give the animal its liberty again was patently an enterprise fraught with the greatest complexity and danger. However, the problem was eventually solved and the method now used has yielded the most fascinating results.

The mark used on whales consists of a thin steel cylinder slightly under a foot in length. Engraved on it are indications giving the time and the place where the whale was marked. The steel cylinder is fired at the whale from a special calibre gun which is effective for the purposes of penetration up to a distance of 50 yards. The projectile has to be aimed so that the steel bullet will lodge in the muscular masses lying under the layers of blubber in the area of the whale's dorsal fin. Here, the cylinder becomes embedded and will stay in place for years without harming the whale. Cases have occurred where whales have been captured with marks on them which have been placed between 15 and 19 years earlier.

In case it may be thought that this process might cause the whale suffering, or give rise to infection, the biologists working on the *Enern* in 1953, under the direction of Professor Johan Ruud, the Director of Oslo Whale Institute, were particularly careful to smear the outside of the cylinders used for marking with penicillin.

The marks are recovered from the carcasses of the whales during the normal course of whaling operations. Sometimes the mark is seen when the dead whale is dragged aboard the factory ship ready for flensing, and sometimes it is not discovered until the carcass is in the processing chambers after the meat has been treated. It is obviously preferable if the mark is found when the whale is on the flensing deck as this permits exact identification. In order to aid in discovery some marks have nylon threads attached to them which serve to catch the eye of the flensers.

Creatures of regular habits

MODERN methods of whale marking started in the 1932/33 whaling season and since that time they have been continued every year. Between 1932 and 1938 a total of 5,350 whalebone whales and sperm whales were marked, principally in the Antarctic. In 1950 the *William Scoresby,* oceanic research vessel of the British Discovery Committee, took part in marking operations, and in the course of a whaling cruise in 1953 the whale catcher *Enern* with Professor Ruud and other scientific colleagues aboard, concentrated on perfecting the marking process.

Although the information has only recently been firmly established it is now well known that whales are not scattered indiscriminately throughout the Antarctic. They tend to concentrate in distinct zones which have been numbered from 1 to 6. Here they return regularly after each northerly migration. According to each particular species this regularity of appearance is more or less constant and can now be considered as a general rule governed by certain exceptions.

The whale marking system has provided the biologist with information of the utmost importance on the age and growth of whales in addition to data on their migratory habits. Dr. N. A. Mackintosh of the British National Institute of Oceanography has observed that whale marking has proved beyond any possible doubt the existence of a regular whale migration between the Antarctic and the tropical seas. It has also shown that after each migration the whales return to their same zones. An interesting piece of whale history has been recorded by S. G. Brown. He relates that a whale marked in 1938 was captured in 1954 less than one degree of longitude away from the exact spot where it was marked sixteen years before.

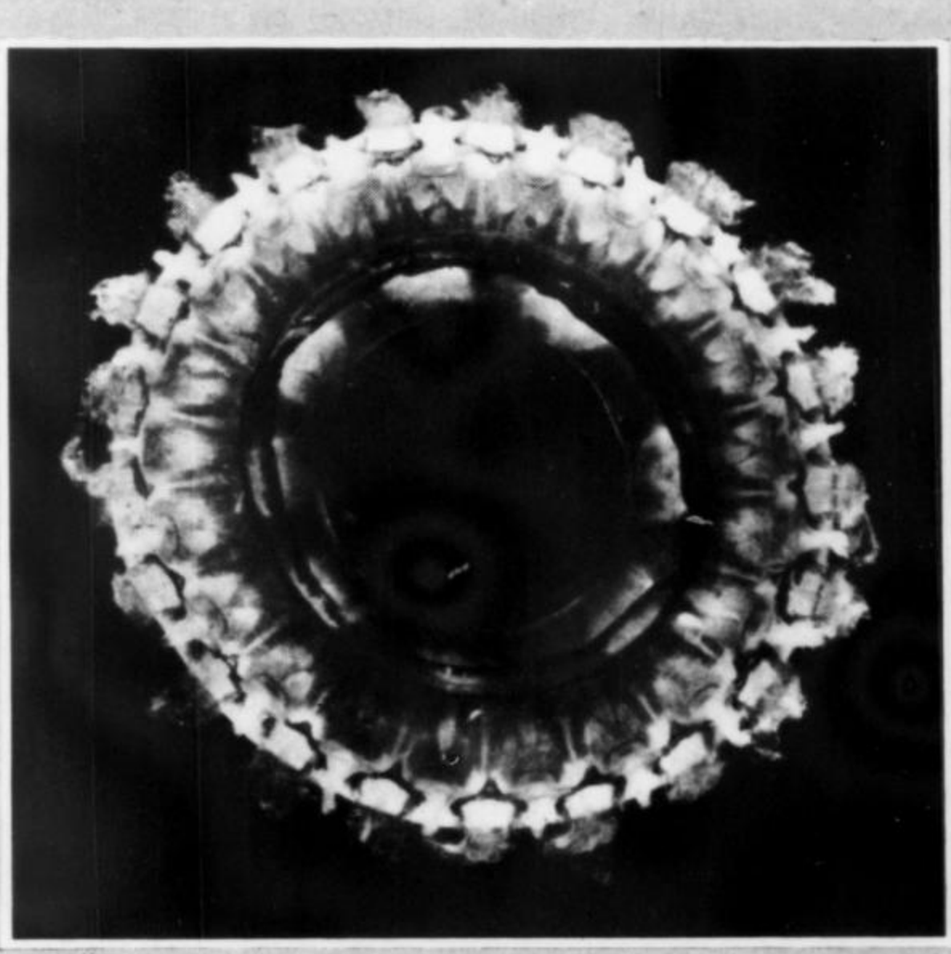
Nations on the watch

OF the various types of whales the Humpbacks are apparently the most regular in their migratory habits, since none have ever been captured outside the marking zones. Rorquals and Blue whales also show a remarkable degree of regularity each year in their return to the Polar Seas.

Whale marking can be of considerable value to the whaling industry and all countries interested in these problems have expressed the desire to intensify marking operations under the auspices of the British National Institute of Oceanography. The work already carried out by the *Enern* was accomplished with the aid of whaling companies from Norway, the Netherlands, South Africa and the United Kingdom. In addition Australia, Japan, New Zealand and the USSR also conduct whale marking. France has a research vessel, the *Orsom I,* stationed at Madagascar which has the equipment necessary for this work, and a laboratory at Pointe Noire in French Equatorial Africa will soon be in possession of similar equipment. Thus it can be seen that close international co-operation already exists for studying the migratory habits of the whale. Such co-operation can only lead in the future to the most fruitful results.

Farming our last frontier

by Charles Drummond



Specimen of plankton (top) as it comes from the depths of the sea. Left, plankton enlarged many times. All sea life depends on this mass of minute drifting organisms. The name plankton is derived from the Greek word meaning "wandering". It is the staple food for fish, and it is also edible by human beings. Right, an enlarged view of a tiny jellyfish only one and three quarter inches in diameter : one of the myriad forms of sea life which go to make up plankton. (Photos National Geographic Society and Black Star-Rapho)

Bread from the sea

A marine algae named *gelidium cartilagineum* from which isinglass, a form of gelatin, is extracted. (USIS photo)

WITHIN the last decade or two marine biologists and biochemists have realized that the possibilities of producing the additional food needed with ever-increasing urgency to feed the world's hungry millions lie in the seas and oceans. In other words, man must now farm the world's "last frontiers", extensively, intensively.

To farm the seas successfully will be a gigantic task calling for the closest integration of the efforts and achievements of all branches of science involved, for although scientific knowledge in oceanography is advancing steadily, the science itself is a relatively young one, originating largely through the 69,000-mile cruise of H.M.S. Challenger some 80 years ago. It was then realised that the problems of how to utilize the products of the seas, to exploit fully its vast riches in food and minerals, could be solved only by the closest collaboration among the sciences concerned.

The cessation of World War II and the knowledge that the world's population is increasing at a rate which threatens to outstrip the most promising advances of agricultural science have focussed the attention of many nations on the urgency of "farming the seas". A great deal of research and much experimentation have been undertaken successfully by independent organizations, a work which is being steadily intensified.

Great meadows for all nations

CLEARLY it is necessary to experiment first in order to decide on ways and means of utilizing fully the seas' resources. It is necessary not only to improve existing fishing grounds but to find (and even create) new ones, not only to encourage faster breeding but to pin-point those kinds of fish which are most useful commercially, not only to discover more ways of utilizing marine plants but to invent methods of growing and harvesting them.

Despite the many obvious difficulties, especially those of a financial nature, the idea of farming the seas possesses several well-defined advantages. These may be summed up thus:—

A. The sea contains great quantities of nutrients which, properly directed and supplemented where necessary, could be made to increase (in the first instance) the growth of planktonic life, and thus in turn stimulate the growth of marine animal life.

B. In marine agriculture there can be no lack of water such as besets terrestrial agriculture.

C. It is believed that marine plant diseases, where they exist, can be more easily controlled in this environment.

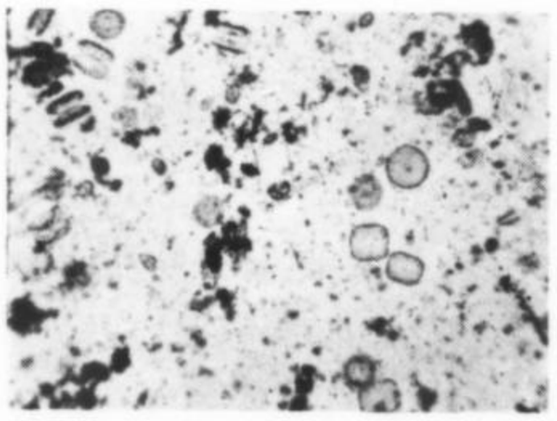
D. The seas, comprising 71 per cent of the earth's surface, are vast enough for all nations, including those which have no seaboards of their own, to participate in marine agriculture.

Space does not permit the detailing of the many research expeditions and experiments conducted to probe the potentialities of farming the seas, but it can be mentioned that outstanding work in these respects has been (and continues to be) carried out by various organizations, including the National Geographic Society, the Marine Laboratories of the University of Miami, and the Agricultural and Mechanical College of Texas, as well as by research departments of the U.S. Department of Agriculture and government bodies of other nations. Under the impetus of ever-growing need, science, industry and government are teaming up as never before to explore and exploit the seas' food reservoirs.

Marine research has long established that algae (comprising the many varieties of seaweed) and both zooplankton and phytoplankton have definite food value. Professor D. W. Hood, of the Agricultural and Mechanical College of Texas, in a note to the writer points out that "these plants, if obtained in large quantities, may be useful for livestock feed, human food, pharmaceuticals, drugs and other important biochemicals." He relates how experiments with a fresh water algae (chorella pyrenoidosa) grown under good conditions proved that this plant can be made to yield around 50 tons of dry material per acre surface per year, having a composition of 55 per cent protein. Under similar conditions, he argues, marine algae could be "farmed" with results approaching this.

Seaweed, dried and ground fine

DURING the two world wars, the development of acute food shortages in many countries brought about numerous experiments with seaweed, conducted both on an official basis and individually. In France tests were made on the use of seaweed gathered on the Atlantic coast, when it was found that horses could eat as much as 3.3 lb. in a ration totalling approximately 17 lb. per day. The French peasants also made a satisfactory silage from seaweed harvested along the coasts. An official of the Animal Nutrition Investigations Department of the Bureau of Animal Industry (Beltsville, Maryland, U.S.A.) points out that even in normal times the Laplanders as well as the inhabitants of the Faroe and Orkney islands use seaweed as a cattle feed. "The material", he writes, "is dried and then ground into a fine meal for mixing with various concentrate feeds. Usually, however, seaweed constitutes only one or two per cent of the total mixture."



Phytoplankton under the microscope. (Photo Fisheries Laboratory, Lowestoft)

Most of the nutritional studies into the uses and value of seaweed have focussed on the production of kelp (the slag or ash obtained by burning seaweed). Marketed as a feed supplement, the value of kelp resides largely in its iodine content; but though both seaweed and kelp meal have been proved to be valuable constituents of animal fodder, especially in areas low in iodine, the overall possibilities of utilizing seaweed directly as a food for domestic animals are of a supplement-ary value only as far as present-day research indicates.

The major possibilities of producing great quantities of food from the seas lie largely in the potentialities of "plankton", those vast "meadows" of minute living creatures, both animal and plant, that live in the sea at varying depths, covering many acres at a time.

Plankton, taken from the Greek word "planktos", means "wandering", and is the name given by the German scientist Hensen in 1887 to the swarms of microscopic organisms which, at the mercy of the seas, drift aimlessly to and fro with the currents. Plankton is of course also found in rivers and lakes. Phytoplankton is the name given to plant plankton. Because many members of animal or zooplankton depend directly on these tiny plants for food, phytoplankton constitutes the basis of animal life in the sea. In turn, zooplankton is eaten by

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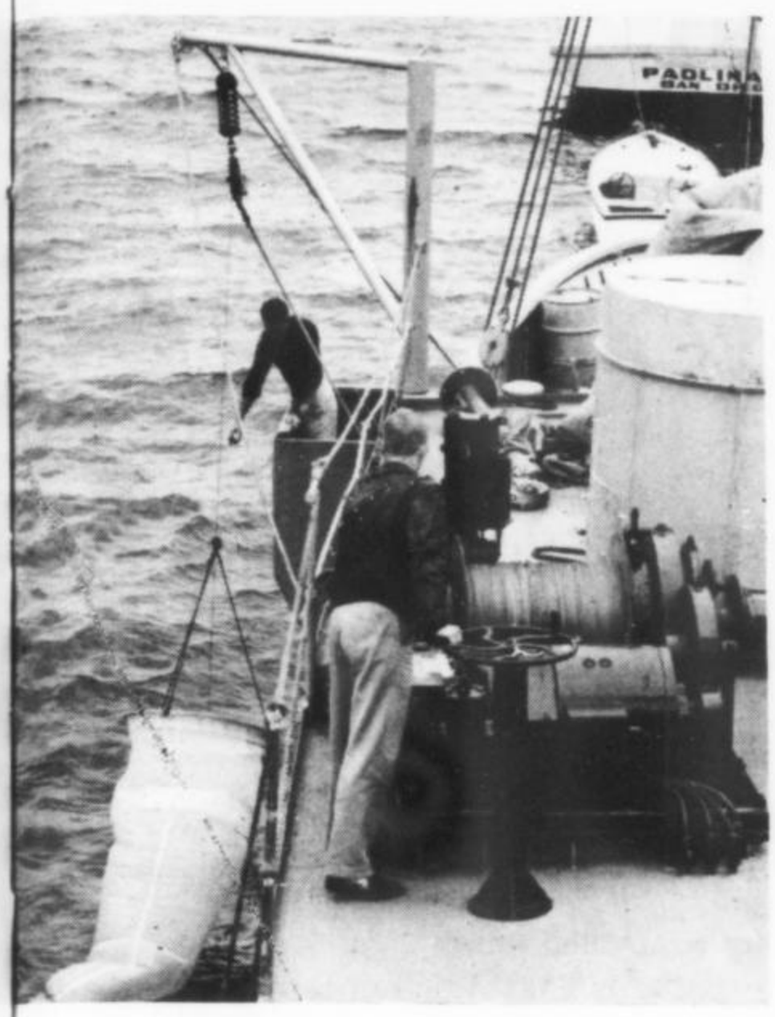
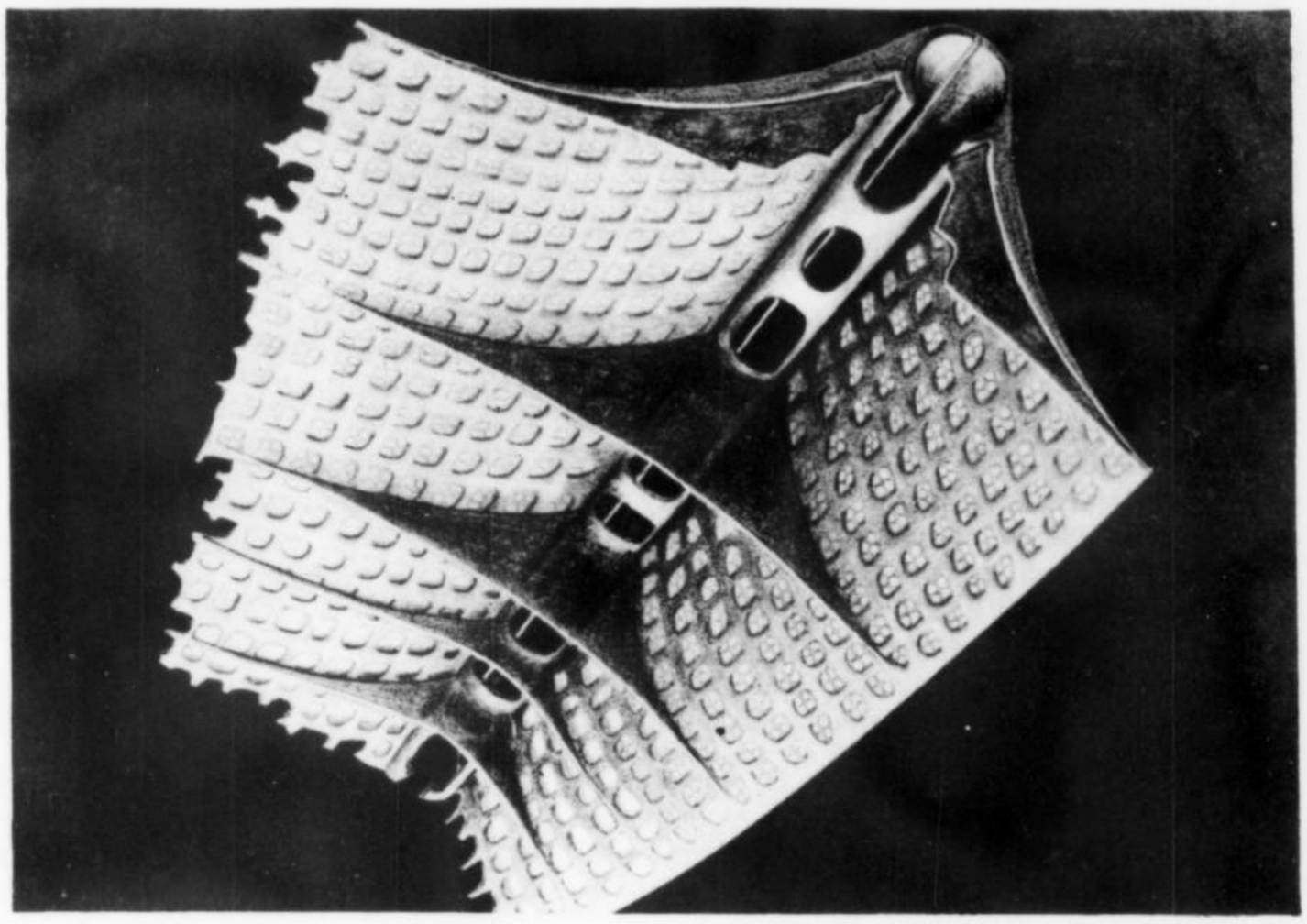
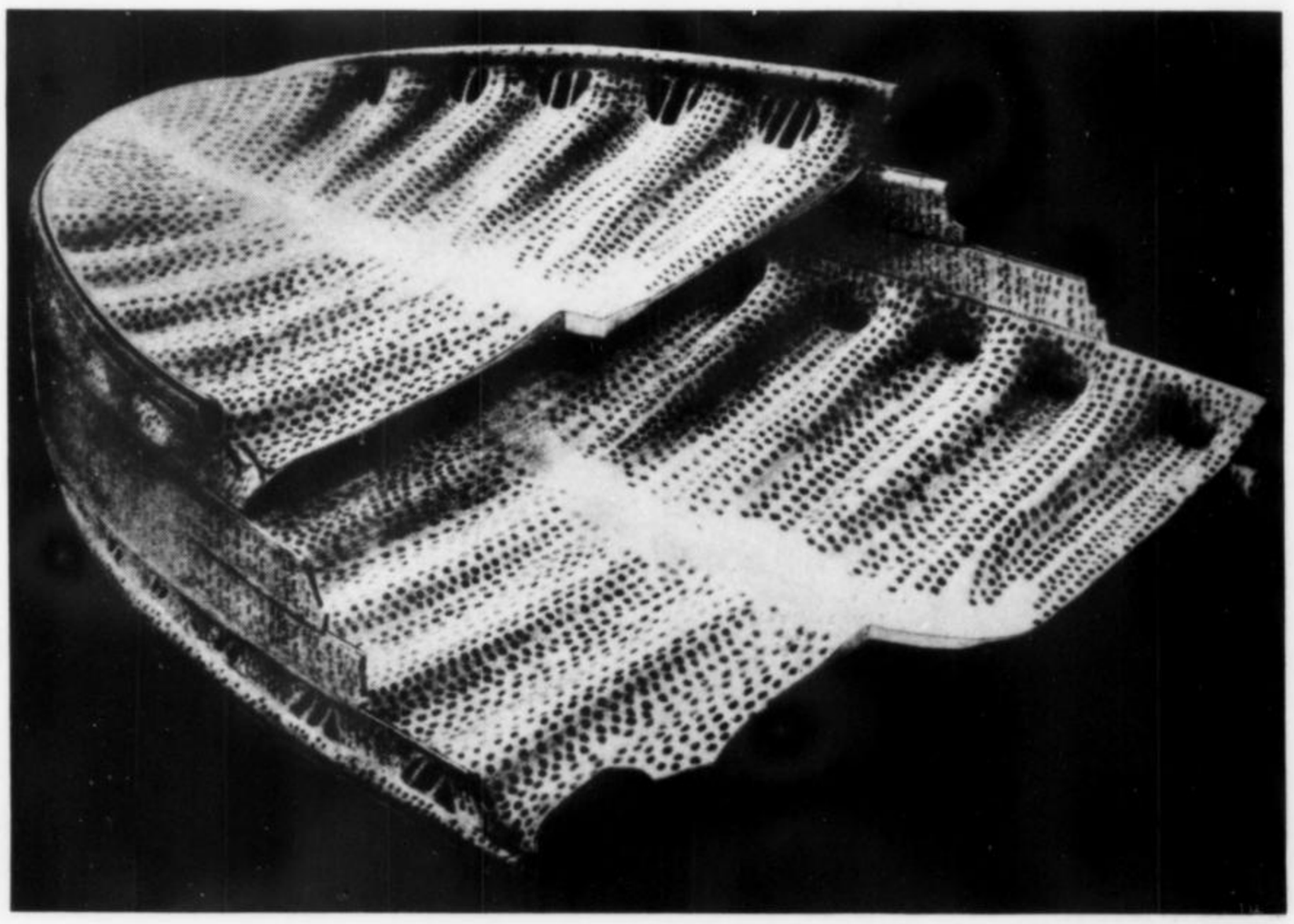




'Skyscraper' tombs on the ocean floor

Analyzing the microscopic plants and animals of the ocean has become an increasingly important part of the science of oceanography and is being carried on in research laboratories throughout the world. Here, at the Scripps Institution of Oceanography in California, two working methods are shown. In the first, a plankton net is being lowered into the sea. Composed of fine silk, this net is equipped with a meter for measuring the amount of water filtered as it is towed through the sea. In the second, the diver plunges to the ocean depths for treasure: not gold, but specimens of sand, rocks and marine flora. The samples thus gathered from the ocean floor will be analyzed in the laboratory to determine their scientific contribution to oceanic knowledge. Enlarged 15,000 times here are some of the results of the search. They are unicellular Diatomes—the most important part of marine plankton, the staple diet of the fish. They are found in vast quantities in the sea and when they die their shells fall to the ocean bed where they form a kind of submarine cliff, often hundreds of feet high. (Photos USIS and Helmcke-Krieger, Max-Planck Gesellschaft)



Bread from the sea

(Continued)

fish and even by whales. Clearly, these "floating pastures" are as vital to marine life as grass is to land animals. Yet these organisms are so tiny that it is possible to see only a few out of the 50,000 or so found in a single pint glass of plankton seawater!

It follows, therefore, that if methods can be devised to increase these pastures, to improve their nutritional value and also to grow and harvest them under controllable conditions, an immense food reservoir of unlimited potentialities lies at hand for the benefit of all.

Scientific investigations have already established the nutritional value of plankton. It has been proved moreover that planktonic life is so adaptable that it can reproduce vigorously in almost all kinds of water or climatic conditions.

This research, much of which has been carried out on American research ships in the Gulf of Florida and elsewhere, is however a long-term project with numerous implications. For instance, it is being used to tabulate the behaviour of important ocean currents such as the Gulf Stream (which we know affects the climate both of Europe and North America and hence the food-growing potentialities of these continents), to establish the locations of good feeding grounds for commercial fisheries, to trace the life histories of different forms of marine life, to find out how seasonal changes and water origins affect planktonic productivity and growth, and many other related aspects.

Plankton has already been put to practical use. At the Microbiological Research Institute in Trinidad, fat is extracted which is used in the manufacture of margarine. During the last war an attempt to harvest plankton as human food was made off the west coast of Scotland by an eminent British scientist, but the attempt did not succeed. German scientists, however, succeeded in producing plankton artificially and extracting fat for use in animal forage.

Major problem exercising scientific minds engaged in planktonic research is that of developing methods of growing and harvesting algae and plankton under fully controlled conditions.

Retrieving a sediment trap from the ocean bed. This instrument is used to study beach formations. (USIS photo)

It is a happy thought not only that research into the seas' natural resources is being intensified, but that in the train of advancing developments in the science of oceanography will come other vital advantages, the most notable of which will probably be the establishment of new fishing areas adequately stocked by new planktonic productivity.

NEEDLE IN A PLANKTON STACK

"Sorting out" a collection of plankton in the marine research laboratory, Aberdeen, Scotland. The sea's "floating pastures" of plankton are as vital to marine life as grass is to livestock. Yet these organisms are so tiny that it is possible to see only a few out of the 50,000 or so in a pint glass of plankton seawater. (COI photo)

FISH IN MYTH AND LEGEND

ILLUSTRATIONS BY L. Nowy

SINCE prehistoric times many of the world's civilizations have sought to identify their peoples with the creatures of the sea, to deify them and to endow them with strange supernatural powers. The fish has appeared as a symbol in the religions, myths and legends of mankind, and even as a constellation of stars in the heavens. Although man has always tracked and pursued fish with the most ingenious of weapons and devices, nevertheless the simple fisherman has always retained a sense of awe for the wonders of marine life. The fish has been venerated as a symbol of tenacity, vitality and fertility. In Japan, the carp has long been a token of courage and perseverance and every year on May 5th, on the occasion of the *Ton-go-sek-ku* (the Boy's Festival), long bamboo poles are raised outside every house with a son in the family. On these poles are strung hollow carp models made of gaily painted paper or cloth—one carp for each son.

by Jean Marabini

A somewhat similar tradition exists in the Caucasus. Here, according to an ancient folklore tale, described by Russia's great poet, Alexander Pushkin, the young men offer pictures of goldfish (a member of the carp family) to the girl of their choice.

Legends and stories about the salmon are to be found among practically all peoples inhabiting northern latitudes where the salmon abounds. The vitality, strength and persistance of this fish is proverbial. Hatched in fresh water, they mature in the open sea and then return to spawn in the very stream where they were born. This king of fish will sometimes travel 2,000 miles inland to spawn. En route it will leap waterfalls, cut through churning rapids and wriggle across the shallows. Only death can prevent it from reaching its goal, and only death will be its reward when it has reached it, as most species of salmon die soon after spawning.

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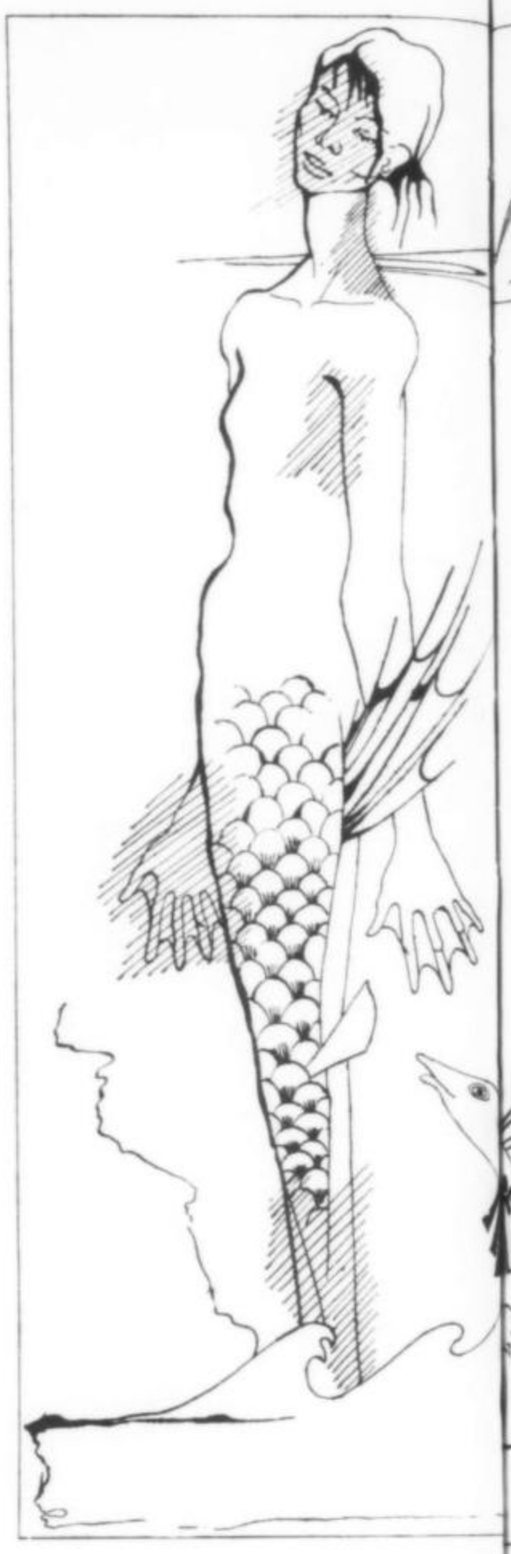
FISH IN MYTH AND LEGEND

(Continued)

The Laplanders, who believe in reincarnation, consider the salmon to be the most noble form into which man can be reborn. This belief has its reflection in a story told by an old Lapp fisherman near Lake Inari in Northern Finland. "Do you see this scar on my head?" he said, "One day I told my son not to fish in the river. But Lapp boys are no different from any other boys and he disobeyed me and went fishing just the same. He speared a salmon, but it was a strong fish and fought courageously. Though badly wounded and covered with blood it finally got away. My son returned in the evening empty-handed and found me lying by the fire with a wound in my head. I showed him the fresh blood. Did I not tell you not to go fishing today? Look what you did when you harpooned me in the river."

Unlike the Lapps the Buddhists in China believed that it is only evil people who are given fish form in their next existence. The fish is one of the eight magic symbols of Buddhism. and it is not without significance that the Chinese dragon often takes the form of a carp. Many Asiatic legends describe in various ways the story of the worthy fisherman who was rewarded because he freed a fish which was the incarnation of a god.

Similar tales have been told by the Slavs. The story of the golden fish which rewards the fisherman who spares his life may well have had the same origin as the Asiatic myths.



However, 2,000 years ago, long before the introduction of Buddhism to China these same tales were being told in India, and this would seem to indicate the existence of a maritime civilization of some form in South East Asia at the close of the prehistoric era.

The underlying theme running through these early myths was the idea of the sea being a vast reservoir out of which gods, saints and kings drew their divine powers. These concepts were probably initiated by peoples whose lives were spent within sight and sound of the sea, and it is interesting to note that they conflict with the later evolution of religion in India and China, where, for both the Hindus and the Chinese, divine power and authority did not come from the sea but from the sky. Certain scholars have concluded from this that the Indian and Chinese civilizations borrowed elements of their culture from this maritime civilization. When brought into contact with a different environment these cultural beliefs were changed and transformed, thus the fish became a dragon in China and a Hindu mythological serpent god in India.

Another fascinating legend in Eastern Asia was that of the fish princess, who always carried with her the scent of the sea. As the story goes, a royal seed on a lotus leaf was blown by chance into waters where a sacred fish was swimming. The issue of this chance mating became the fish princess who, like Cinderella, was held in a form of slavery until, with her singular charm, she seduced a Prince by whom she had some wondrous children.

As fish were a symbol of fertility it was quite natural to portray them as being assexual. The tales of the sea sirens came from the Far East to the Mediterranean where, as we know, Ulysses had some encounters in the waters off the north coast of Sicily, and thence northwards to follow the shores of the Atlantic where the navigators of those days had many stories to relate of the appearance of the sirens.

Greek mythology was full of sirens and mermaids, and despite Christian and rationalist attacks on belief in such creatures, their fame survived and the beliefs persisted. They continued to sing their timeless songs in bewitching voices, and the Nordic water nymphs and Hans Christian Andersen's little mermaid are but further proofs of the tenacity of these myths.

A primitive aboriginal myth from Australia, which has also appeared in various different forms in peasant legends from other lands, is that of the frog, the moon and the seas. These Australian primitives imagined the moon as a form of monstrous frog, and inside the body of the frog were the seas of the world. The story goes that the frog one day burst out in laughter when watching the antics of an eel, and

thus set free the oceans. It is significant to note, however, the inter-connection in this story between the moon and the sea. Perhaps these Australian aboriginals knew of the relationship between tides and the moon. This frog myth is also extant in the folklore of other countries, and it is popularly believed that the frog has the power to reflect itself in the face of the moon. Whether or not these stories originated among the aborigines it is difficult to say, but what is reasonably certain is that traces of the beliefs held by the seafaring civilization which first inhabited South East Asia have come to light in the Mediterranean basin and in the Middle East.

The Philistines had a fish-god called Dagon, and the Carthaginians worshipped the fish as a symbol of strength, and had an image of a fish buried with them. The Egyptians, Herodotus noted, regarded the eel as sacred. The Chaldeans worshipped the fish-god Cannes which was supposed to have imparted wisdom to the first men on earth. Even today in western Syria the old Dagon cult of the Philistines still lives on in the worship of certain fish which no fishermen are allowed to catch. Although originating from a different source it is of interest that the Jews are still prohibited by their religion from eating fish which have neither fins nor scales.

There have been, of course, many references to fish in the Bible, sometimes in natural terms and sometimes in terms of miracles. The Gospels tell us that the first Christians were very often simple fishermen, and this in a way would explain the importance given in the Bible to fish as a source of food. In its Greek name the fish became an actual symbol of Christ, as the letters of the Greek word ICTHUS furnished the initial letters of the phrase "Jesus Christ the Son of God Saved".

In the early Christian era the martyrs absorbed and transformed the idea of the symbolism attached to fish and fertility and made it part of their faith. Also among various non-Christian peoples there could be seen a similar type of transformation. In forming the capital letters of their alphabets the fish appeared in written form. In the Frankish cemetery at Marchepot in the Somme region of France, there is a bronze plaque with a fish and dove in the same group—two Christian symbols joined together on a pagan monument.

Both in past centuries and in modern times the fish has exercized a considerable influence on everyday language. The ancient Phoenicians called a hermit by the name of pike, as this fish was reputed to be—and still has the same reputation today—anti-social. Terms referring to fish have a variety of meanings, but in the majority of countries these are usually of a disparaging nature—"As drunk as a fish" would serve as a good example. In France an April Fool joke is called an "April Fish" In coastal areas, however, fewer unfavourable words and references to fish are found, and this can be readily explained by the fact that the maritime peoples very often depend for their food and keep on fish and they thus pay a form of tribute by flattering references in their everyday language.

Whatever may be the final judgment on the facts relating to the fish as man's first ancestor, there can be no doubt that the fish has exercized a profound influence on civilization in all its forms. The fish has provided the key to certain things of the past, and it may be, as simple Celtic inhabitants of Amlwch, Wales, believe, that it can also predict the future. As H.G. Wells once said, "when humanity has exhausted itself in dreams and lust for power it may well be that the only remaining sound on earth will be the murmur of the sea lapping on deserted beaches." The fish will certainly then have re-captured their kingdom for all eternity.

STRANGE FACTS ABOUT NEPTUNE'S REALM

(Continued from p. 16)

surface of the globe rises two and a half miles above sea level almost 50 % of the ocean bed lies the same distance below the surface of the sea. The world beneath the seas is greater than the world above them.

Upside-down mountains

THE highest mountain in the world, Everest, rises to a height of 29,034 feet, but in the Pacific Ocean near the island of Mindanao in the Philippines the sea plunges to a fantastic depth of 35,530 feet. This figure is the world's record for ocean depth. At this same point in the Pacific, the *Snellen* in 1930 plumbed the greatest known depth by line. A piece of red clay was brought to the surface from the ocean bed 33,000 feet below.

World's tidal contrasts

THE Bay of Fundy on Canada's Nova Scotian coastline has the distinction of having the largest tides in the world. Twice every day 100,000 million tons of sea water are swept into the Bay causing tides which reach a height of nearly fifty feet. By way of contrast to this gigantic inrush of water the Mediterranean is practically tideless.

Ocean wave globetrotters

OCEAN waves are great travellers and it has now been discovered that some will begin their life in the southernmost seas of the world and after that traverse a quarter of the circumference of the globe, some 6,500 miles, before they disappear and die. Meteorologists are now studying the life of waves and wave motion and recording their results. This information has made it possible to predict in advance the arrival of hurricanes and storms.

Herrings in History

THROUGHOUT the Middle Ages the herring played an important part in the economic and political life of Europe. In the thirteenth, fourteenth and fifteenth centuries the herring shoals were concentrated in the Sound and the Belt, the narrow passages between the North Sea and the Baltic. Ports in Denmark and Southern Sweden owed their prosperity to this fact and one of the reasons for the establishment of the famous Hanseatic League of North German towns was the determination of its members to enter into competition with Denmark in the herring fishing. But in the fifteenth century the herrings were displaced from their usual feeding grounds and driven into the North Sea. The reason for this migration is still a mystery but it is thought to have been caused by powerful submarine currents which followed a period of very high tides. The departure of the herrings weighed heavily on international relations at the time as the ports of Southern Sweden, Denmark and Northern Germany were impoverished and the ports in the Low Countries became prosperous. It has been said that at the time the Dutch abandoned agriculture for herring fishing and thereby improved their shipbuilding and navigation.

Deep Sea Voices

IT used to be assumed that silence was to be found in the ocean depths but it has now been proved that they are actually as noisy as a farm-yard at feeding time. Fish utter piercing cries. They groan, cackle and trumpet so that the deep is filled with a cacophony of sound. During the 1939-45 war the US Navy made a systematic study of the noises made by fish for two very particular

DETECTIVES OF THE SEA

Photos on these pages show research being carried out at Scottish Home Department Marine Laboratory, Aberdeen. 1.—Hydrography Department assistant prepares drift bottles and plots on charts where they are found. Three thousand of these bottles are set free each year. 2.—Tagged herring which had travelled 180 miles is examined after being returned to laboratory. Object is to check migration, movements of which are shown on charts in background. 3.—The life of the lobster comes in for a searching investigation. One of senior scientific officer's jobs is to advise on lobster catching restrictions. 4.—Examination of a plaice's earbone reveals its age. Check on the rate of tagged fish gives an idea of rate of fishing and of natural mortality. 5.—What did he have for breakfast? Examination of fish stomach reveals natural fish foods, thus increasing knowledge about distribution of food organisms for shoals. 6. —Fish landings at Aberdeen are not as large and lucrative as they were some years ago. Fishermen are helping Laboratory investigation, returning tagged fish and allowing scientists to take samples of scales and measure catches. (C.O.I. photos)

reasons. The acoustic mines which were then being brought into use were exploded by the vibrations caused by the noise of ships motors but it was feared that the sounds made by fish might also explode these mines. Ultra-sensitive microphones had been sunk deep in the sea near the US coastline to pick up the noise made by submarine motors but it was found that these were also picking up the noises of the undersea world, thus making it impossible to distinguish the sound of the submarines. Special electrical filters were constructed to eliminate the undersea noises but retaining the noises made by ships engines.

The study of sounds made by marine animals is only in its infancy, but although many mysteries remain to be solved it is possible to gain a fair idea of the whole strange phenomenon. Fish do not possess vocal cords and so they produce noises by grinding their teeth, oscillating their air bladders, rubbing their bones together and jerking their heads. It is of some interest to note that while the human muscle can produce only 36 vibrations per second that of certain fish can produce up to 2,332.

In old age the "voices" of fish, both of the male and female, tend to become lower in tone. In those types which produce sounds by means of their air bladder this fact is explained by the elongation of the bladder with the consequent lowering in pitch of the sounds made.

It is now possible to distinguish certain types of fish by their "voices". However, this study has not proved as easy as it was thought at first as when fish are taken into captivity for the purpose of recording the sounds which they make, it is found that they do not produce the same amount of sound as when they are at large in the ocean: some even become quite dumb.

Fish are not the only marine animals capable of producing sounds. One type of round shrimp makes a frying noise by knocking its claws together. This sound, when made by one shrimp is practically imperceptible, but it is quite noticeable when there are some hundreds grouped together on a rock.

Aircraft made of sea water

SEA water contains between 350,000 and 400,000 tons of magnesium per cubic mile. In 1941 scientists devised a method of extracting the metal directly from sea water by means of a chemical process. One aircraft contains on an average half a ton of magnesium and it was due to the extraction of magnesium from sea water that aircraft production was expanded so rapidly during the course of the Second World War.

Dangers of the sea coasts

NEARLY 2 million square miles of land in the coastal regions of the continents and islands would be submerged if sea water did not possess a certain degree of elasticity. Although much less elastic than gas, sea water has sufficient elasticity so that the upper levels of water compress the lower layers. If the lower water was not compressed the general sea level would rise by about 100 feet throughout the world.

Gold not worth the taking

EVERY ton of sea water contains about three quarters of a grain of gold and if all the gold were extracted from the seas and oceans of the world there would be available 77,000 lbs of gold for every single person. Unfortunately the cost of production of this gold comes to more than it would be worth.

Killed by their own weight

LARGE whales can weigh anything up to a maximum of 100 tons and this enormous weight when suspended in water is consequently reduced in conformity with the principle of Archimedes. Normally, therefore, whales are supported by the water and the muscles which they use for breathing have no need to be particularly strong. But once caught on dry land their soft underbodies are pressed down so hard on the unyielding ground by their own weight that it becomes impossible for them to breathe, and in the matter of an hour or so they have been smothered, not for lack of air, but for lack of strength to expand their lungs against their own enormous weight.

Unesco in pictures

Learning to 'hear' with their eyes

Pupils of Professor J.A. van der Beek have now got used to being beaten on the back, pounded on the chest and seized by the throat (above). If they utter a sound in response to this apparently rough treatment the professor, founder of a school for deaf-mute youngsters at Bandung on the island of Java—the only one of its kind in Indonesia—is delighted. His cuffings, slaps and strangle-holds are all part of a modern method for teaching children born deaf, and therefore mute, how to speak. The school is now a Unesco Gift Project, so that people in other lands can help it to obtain vocational materials and teaching aids. (Unesco photos)

Farmers' university in a reclaimed land

Farmers in Ceylon's barren "dry zone"—now being rapidly reclaimed and resettled—have their own rural university at Minneriya, where Unesco, in collaboration with the Ceylon Government has set up a fundamental education pilot project, with library, classrooms, workshops and a model farm. Techniques are being developed and people trained in agricultural extension work, home economics, cottage industries and health education. Above, Unesco educator pulls himself across a river. Left farmers perform the "winnowing dance". (Unesco photos)

U.N. planning for atomic power era

A new era of power through atomic energy began on December 4, 1954, when the United Nations General Assembly agreed on the establishment of a new agency for international co-operation in developing the peaceful uses of the atom. On August 8, 1955, scientific delegates from some 80 countries will meet in Geneva, to study the technical and scientific factors involved and to explore the means required to develop atomic power on an international scale. The preparatory committee of this conference met in Unesco House, Paris on May 23. Dr. H. J. Bhabha of India, will be President of the Geneva Conference, and Dr. Walter J. Whitman of the United States (above) has been appointed Secretary-General. (Unations Photo)

Stamp honours Unesco's work

Collectors can now add a new stamp to their United Nations series. Issued by the United Nations to honour the work of Unesco and designed by George Hamori of Israel, the stamp was placed on public sale on May 11. It is issued in two denominations: 3 cents and 8 cents. Photo shows Mr. Dag Hammarskjold, U.N. Secretary-General, left, presenting a folder of the new stamps to M. René Maheu, one of Unesco's Assistant Director-Generals. (Unations Photo)

Letters to the Editor

Sir,

I have long been a reader of the UNESCO COURIER which I find an inexhaustible source of news and reports from the most diverse corners of the world. But as I should like to know more about the habits and customs of different peoples and to make contacts in all countries, I should be grateful if you would help me to make friends in other lands.

I am Lebanese and I could correspond equally well in English and French. My hobby is stamp collecting and I am interested in music, dancing, books and sports.

Anièce Elias

B.P. 30,
Beirut,
Lebanon.

Sir,

I wish to take out a subscription to the UNESCO COURIER for a friend of mine, but I should like to remain anonymous. My friend is always anxious to increase his knowledge of the world and it will be a great pleasure for him to draw from the COURIER that aspect of culture which is indispensable to all thinking and active members of mankind.

I appreciate the value of each issue of the COURIER. The one I received today on "Puppets" seems to be well-filled and the articles in the previous issue on Latin America were encouraging. When one realizes how many men and women—and how many consciences—are working to improve the lot of disinherited peoples, it is some consolation for the set-backs of humanity...

M. V.

France.

Sir,

I belatedly ran across the articles on Japan in your issue No 4/5, 1954, (Aug-Sept, U.S.). They were very good. I have always been interested in Japan, and I was very intrigued with the girl Michiko Jinuma, about whom you had a full article. If she speaks English, I would like very much to correspond with her. Can you give me her address? I would appreciate it very much. I am incidentally a graduate student at the University of California in Los Angeles.

Alan Campbell.

4108 Bledsoe Avenue,
Los Angeles 66,
California.

No address available - Ed.

Sir,

I have just renewed my subscription and that of the Esperanto Group in Rochefort to the UNESCO COURIER. Personally and on behalf of the members of our Esperanto Group, I wish to say with what interest and pleasure we read the COURIER. Our interest would, of course, be doubled if an Esperanto edition of the COURIER was also published.

Pierre Babin

Chairman,
Groupe Esperantiste Rochefortais,
Rochefort-sur-Mer,
France.

From the Unesco Newsroom

UNDER THE UN FLAG: The UN flag flew at sea for the first time recently when two modern deep-sea fishing trawlers—the first of a fleet of ten built by the United Nations Korean Reconstruction Agency (UNKRA) to help the recovery of the Korean fishing industry—sailed from Hong Kong for Pusan in Korea. The end of fighting found Korea—which was formerly one the six foremost fishing countries of the world—stripped of boats, gear and fish-packing equipment—all essential to maintaining the health of the nation, as 80 % of Korea's protein diet depends on fish products. Under UNKRA's aid plan ten 77-ton trawlers costing $500,000 are being built for the Republic's fishing fleet, and nets and equipment have also been bought.

★ **POPULAR 'PILOTO':** *One of the largest and fastest developing educational institutions in the city of Medellin, Colombia, is the model library set up as a public library pilot project under Unesco sponsorship. It is especially popular with children, who, it is reported, have waited in long lines after school hours in the rain-swept streets and have even bartered places with one another so as to be first into the library. "La Piloto", as the Colombian press calls the library, had already outgrown itself six months after opening, and the question of a new building is now being studied.*

CLASS OF 55: Thirty-two teachers who have received specialized training in health, agriculture and community development as well as in primary school teaching methods will shortly graduate from the national fundamental education centre, set up in the Liberian back country by the Government and Unesco. Teachers will return to their home villages scattered throughout Liberia to run primary schools which will also be outposts in a campaign to raise rural living standards. This national fundamental education centre—one of three now being run in Africa and Asia with Unesco technical assistance—has succeeded in opening 19 primary schools in the surrounding district.

★ **PLACE FOR WOMEN:** *Nearly* 100,000 *Japanese women were taking courses in universities or institutes of higher education last year—a* 300 *per cent increase on* 1947 *when Japan's new education law came into force. The fact that three out of every hundred girls aged between* 19 *and* 22 *now attend universities or similar institutions has led to the creation of many new educational establishments and of openings for women teachers. There are now, for instance, some* 130 *headmistresses of primary and secondary schools, while more than* 2,000 *women serve on educational committees. Many Japanese housewives attend university-organized summer schools, as well as family welfare courses.*

GLOBAL AID PLAN : Direct aid, ranging from the services of specialists in cosmic rays, nuclear physics and the teaching of social sciences, to the development of national libraries and the organization of educational television will be given to 41 countries this year by Unesco. Nearly $800,000 have been allocated under a new programme voted by Unesco's General Conference last December to cover projects in education, science and culture in 41 member states, associate members and non self-governing territories. In all, 69 experts are to be sent out, 46 fellowships awarded, and $41,000 worth of equipment provided over the next 20 months.

★ **MEET THE U.N:** *Visitors to U.N. Headquarters in New York now also see something of the Organization in action in faraway places through a special one-hour programme — "Introduction to the United Nations"—designed to acquaint the public with the U.N.'s aims, structure and work. It includes film-showings, a lecture and a question and answer period. More than* 1,000 *of the three to four thousand daily visitors to U.N. can thus see, for example, how Philippine efforts to raise health and educational standards are aided by the World Health Organization and by Unesco and how the U.N. is helping to prepare Somaliland for self-government.*

THE MISSING FIFTH : More than a fifth of food crops planted by the world's farmers never reaches the dinner table. The Food and Agriculture Organization (FAO) reports that insect pests and diseases destroy or seriously damage this much of plantings each year. Knowledge of control measures is, however, increasing, but there is a new threat of pests and diseases being spread more easily from one continent to another because of improved and faster international transport. FAO experts are helping many countries to organize or expand control programmes.

★ **SHARING THE ATOM:** *A link in the chain of international co-operation for the peaceful use of atomic energy was forged at Oak Ridge Institute of Nuclear Studies, U.S.A. recently when the first of a series of classes for scientists from different countries began to study how to handle radio-isotopes. Thirty-one scientists from* 21 *countries will attend the four-week courses at Oak Ridge. Previous American and Foreign graduates from this Institute already are applying their training to a wide range of projects—from cancer therapy to experiments in the preservation of perishable food. (See the* UNESCO COURIER *"The Promise of Atomic Power" March 1955).*

GIVE-AND-TAKE: Tarascan Indians in the Mexican State of Michoacan recently learned some useful lessons from Pakistani teachers who were studying fundamental education work in and around Latin America on a one-year Unesco fellowship—and the Pakistanis picked up some new educational techniques for use back home. One result of their visit is that some Tarascan Indian families are no longer sleeping on traditional floor mats, but on Pakistani *charpeys*—simple wooden beds with mattresses made of woven strings. And Indian fishermen on Lake Patzcuaro have learned that their nets will last three times as long if they dip them in the juice of a certain plant. The ten Pakistani educators, agricultural experts and social workers spent eight months at Unesco's Regional Fundamental Education Centre for Latin America at Patzcuaro, Mexico, and also watched rural development campaigns in both Puerto Rico and Jamaica.

★ **THROUGH THE LENS:** *The world of photography recently went on display in Paris at what was probably the most comprehensive international event of its kind ever held—the first Biennial of Photography, Cinema and Optics. A series of exhibitions demonstrated world progress in photography and motion pictures, and the French National Commission for Unesco sponsored meetings where leading scientists, educators, artists and others who use photography in their work exchanged ideas and discussed needs and the means of meeting them with experts in photography. The Biennial showed how developed photography is today as a universal art form and how important it is for communicating ideas and information.*

EUROPEAN EQUALS: Nine countries—Denmark, France, the German Federal Republic, Iceland, Ireland, Luxembourg, Norway, the Saar and the United Kingdom—have now ratified the European Convention on the equivalence of university entrance examinations. Drawn up by the Council of Europe in 1953, the Convention gives students who have passed the entrance examinations to a university in any one of the nine signatory nations an equal right with nationals to enter a university in one of the other countries.

New UNESCO Monthly Replaces Quarterly Bulletin

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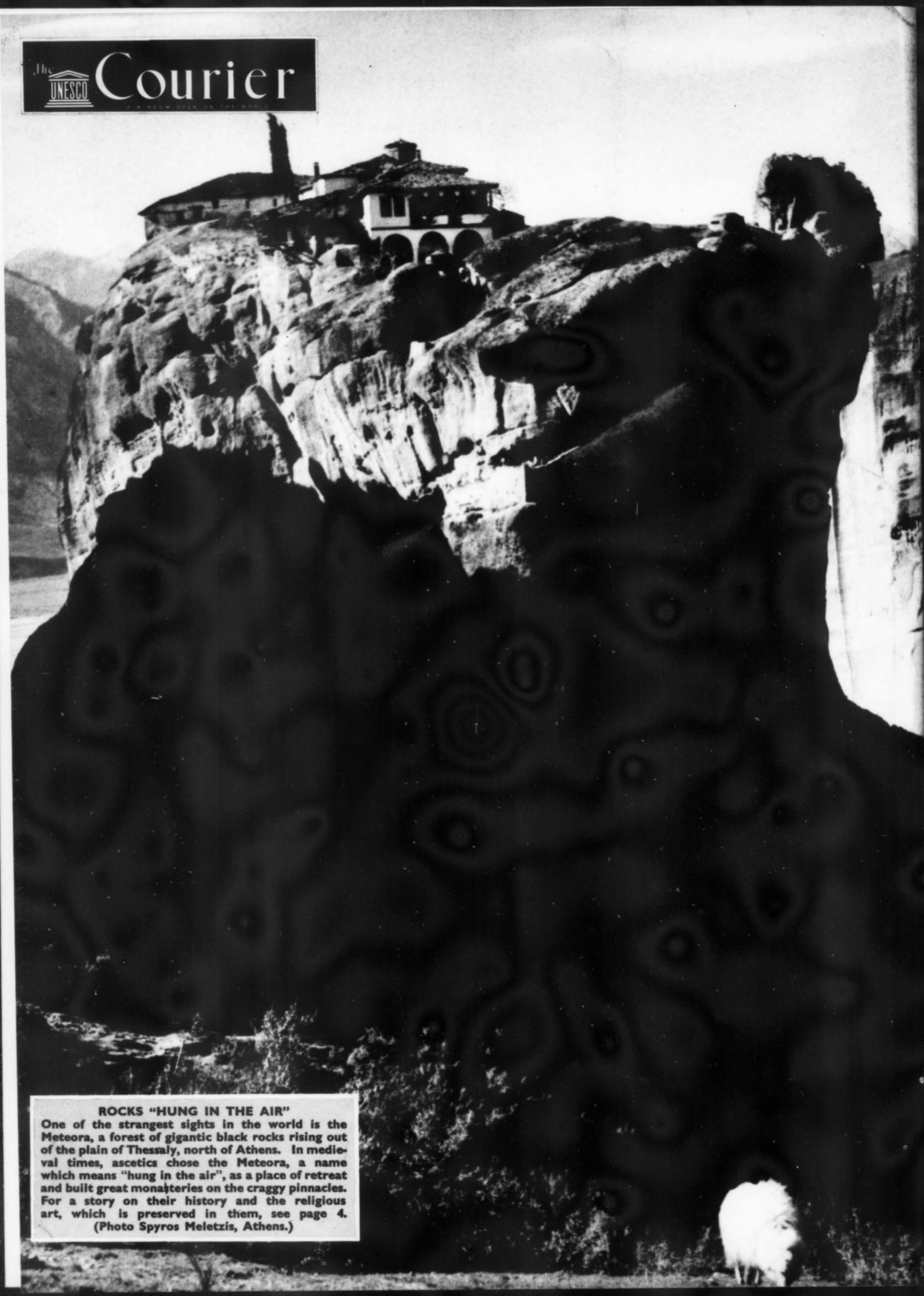

ROCKS "HUNG IN THE AIR"

One of the strangest sights in the world is the Meteora, a forest of gigantic black rocks rising out of the plain of Thessaly, north of Athens. In medieval times, ascetics chose the Meteora, a name which means "hung in the air", as a place of retreat and built great monasteries on the craggy pinnacles. For a story on their history and the religious art, which is preserved in them, see page 4.

(Photo Spyros Meletzis, Athens.)